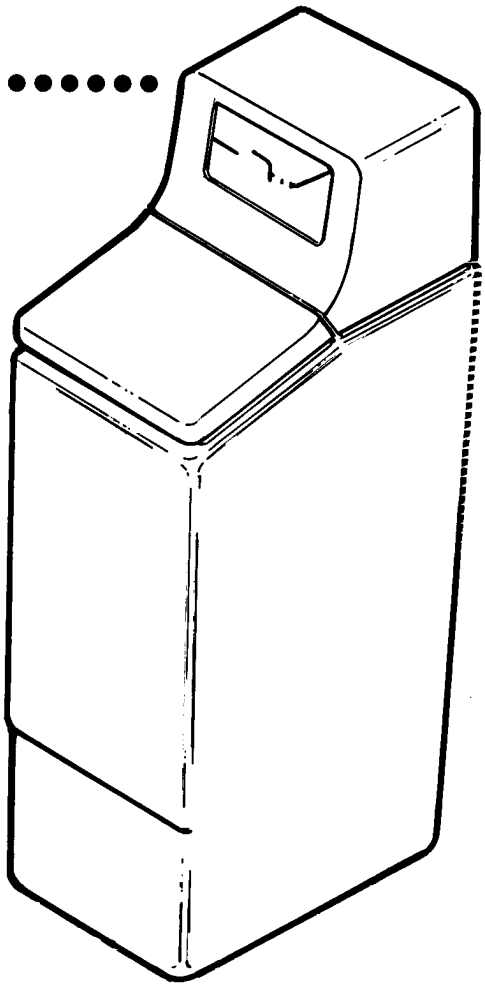
OWNERS MANUAL

How to maintain and operate your EcoWater Series 500 water softener

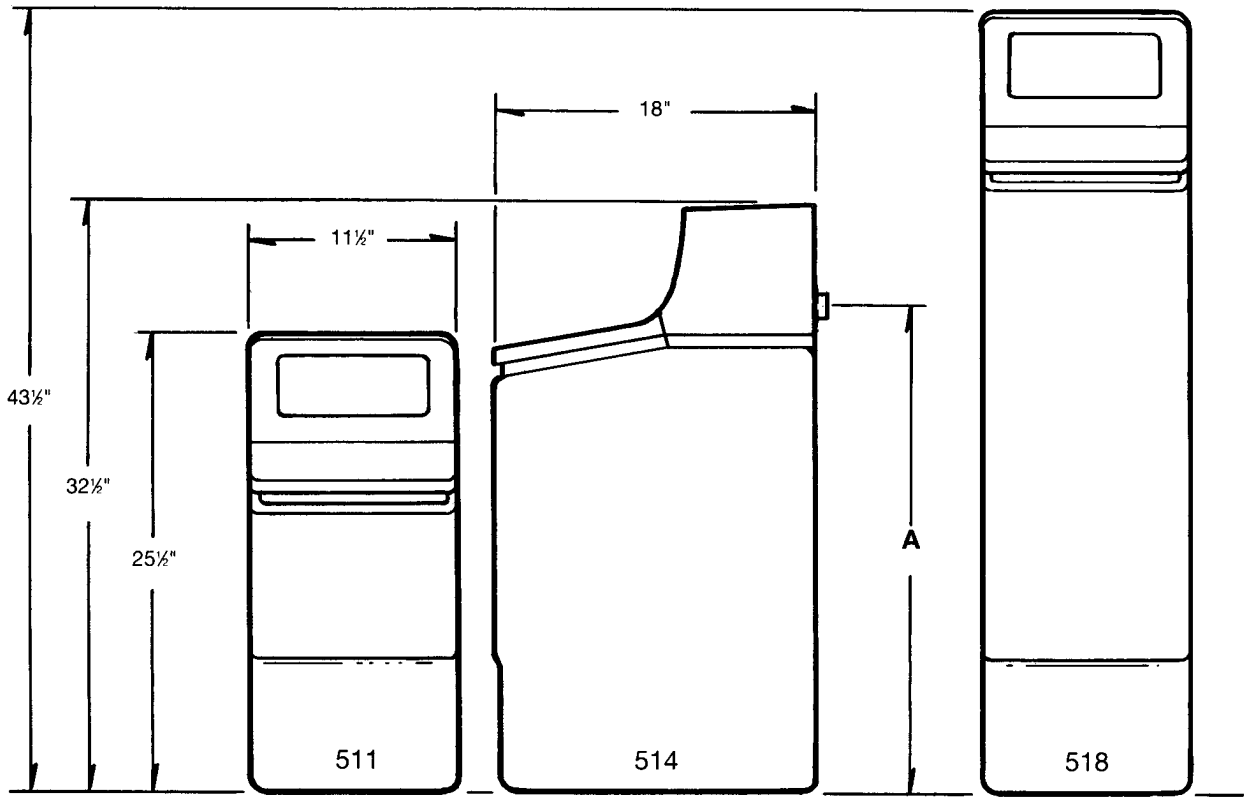


. . . solid state

. . . electronic demand

ECOWATER™
SYSTEMS

DIMENSIONS



SERIES 500 MODEL	INLET-OUTLET DIMENSION A	INLET-OUTLET CENTERLINE	RESIN TANK NOMINAL SIZE
511	20-1/2"	3-3/8"	8" dia. x 19"
514	27"	3-3/8"	8" dia. x 25"
518	37-3/4"	3-3/8"	8" dia. x 35"

FOR FUTURE REFERENCE, ENTER THE FOLLOWING INFORMATION.

MODEL NO.①② _____ SERIAL NO.①② _____

DATE CODE② _____

DATE OF INSTALLATION: _____

WATER HARDNESS _____GPG IRON CONTENT _____PPM

WATER HARDNESS (SETTING): _____ see page 16

①on rating decal ②on shipping carton

NOTE: SEE PRODUCT SPECIFICATION SHEET FOR TECHNICAL INFORMATION.

INTRODUCTION

UNPACKING

The water softener is shipped completely assembled, in 1 carton. A bag of installation parts, and this manual, are also included.

Thoroughly check the water softener for possible shipping damage and parts loss. Also inspect and note any damage to the shipping carton. Notify the transportation company if damage is present. The manufacturer is not responsible for in-transit damages.

Remove and discard (RECYCLE) all packing materials. We suggest you keep the small parts in the bag until you are ready to use them.

TABLE OF CONTENTS

Page

Warranty.....back cover
Water/Water Conditioning.....4-5
Planning Installation.....6-7
Installation Steps.....8-11
Programming Face Plate-Timer
- Solid State.....12-14, 24
- Electronic Demand.....15-19

Water Softener Operation.....20-21
Service Information (general).....22-23, 30
- **Refilling with Salt.....22**
- Solid State.....24-26
- Electronic Demand.....26-29
- Wiring Schematics.....26

Repair Parts.....32-35

SAFETY GUIDES

FOLLOW THE INSTALLATION INSTRUCTIONS CAREFULLY. FAILURE TO INSTALL THE WATER SOFTENER PROPERLY VOIDS THE WARRANTY.

BEFORE YOU BEGIN INSTALLATION, READ THIS ENTIRE MANUAL. THEN OBTAIN ALL THE MATERIALS AND TOOLS YOU WILL NEED TO MAKE THE INSTALLATION.

CHECK LOCAL PLUMBING AND ELECTRICAL CODES. THE INSTALLATION MUST CONFORM TO THEM.

USE ONLY LEAD-FREE SOLDER AND FLUX FOR ALL SWEAT-SOLDER CONNECTIONS, AS REQUIRED BY STATE AND FEDERAL CODES.

USE CARE WHEN HANDLING THE WATER SOFTENER. DO NOT TURN UPSIDE DOWN, DROP OR SET ON SHARP PROTRUSIONS.

DO NOT LOCATE THE WATER SOFTENER WHERE FREEZING TEMPERATURES OCCUR. DO NOT ATTEMPT TO TREAT WATER OVER 120°F. FREEZING, OR HOT WATER DAMAGE VOIDS THE WARRANTY

AVOID INSTALLING IN DIRECT SUNLIGHT. EXCESSIVE SUN HEAT MAY CAUSE DISTORTION OR OTHER DAMAGE TO NON-METALLIC PARTS.

THE WATER SOFTENER REQUIRES A MINIMUM WATER FLOW OF 3 GALLONS PER MINUTE AT THE INLET. MAXIMUM ALLOWABLE INLET WATER PRESSURE IS 125 PSI. IF DAYTIME PRESSURE IS OVER 80 PSI, NIGHTTIME PRESSURE MAY EXCEED THE MAXIMUM. USE A PRESSURE REDUCING VALVE IF NECESSARY. (ADDING A PRESSURE REDUCING VALVE MAY ALSO REDUCE THE FLOW.)

THIS WATER SOFTENER WORKS ON 24 VOLT – 60 Hz ELECTRICAL POWER ONLY. BE SURE TO USE THE INCLUDED TRANSFORMER.

INTRODUCTION

WATER

Man's very existence depends on water. It is 1 of the basic commodities of life. Water is best as nature provides it, is a common misconception. Practically all natural water needs refinement or treatment to make it safe to drink or more satisfactory to use.

The earth's water supply cycle starts in the upper cloud layers. As it falls to the earth as rain or snow, it picks up impurities and gases from the atmosphere. Landing on earth, it seeps over and through the ground, dissolving earth minerals. Passing through limestone, it dissolves calcium and magnesium, the hardness minerals. Iron deposits impart iron to the water. Acidity and sediments are other water conditions.

Municipal water supplies come from surface reservoirs, such as lakes or rivers, or from underground reservoirs. Usually, municipalities chlorinate the water to make it safe to drink. Sediment is removed by filtration. Tastes and odors are reduced or eliminated. The water is conditioned to comply with certain specifications. However, hardness minerals and/or tastes and odors are not always reduced to the most desirable levels.

Underground reservoirs provide our private water supplies. Because the water is raw and untreated, it can have varying amounts of hardness, iron, tastes, odors, acidity, or combinations of these. Different localities and water levels affect mineral contents.

WATER CONDITIONING

Water conditioning is the treatment of 4 general conditions. These are ① Hardness, ② Iron, ③ Acidity, ④ Sediments.

① HARDNESS is a term to describe the presence of calcium and magnesium minerals in water. A chemical analysis accurately measures the amount of minerals in grain weight. For example 1 gallon of water with 5 grains per gallon (gpg) hardness has dissolved minerals, that if solidified, about equals the size of 1 ordinary aspirin tablet. One gallon of water, 25 gpg hard, has a mineral content equal in size to 5 aspirin tablets. Water hardness varies greatly across the country. It generally contains anywhere from 3 to 100 gpg.

Hard water affects living in general. Hardness minerals combine with soap to make a soap curd. The curd greatly reduces the cleaning action of soap. Precipitated hardness minerals form a crust on cooking utensils, appliances, and plumbing fixtures. Even the tastes of food are affected. A water softener conditions the water and removes the hardness minerals to eliminate these problems, and others. Pages 19-21 describe how the water softener works.

SODIUM INFORMATION: Water softeners using sodium chloride (salt) for regeneration add sodium to the water. Persons who are on sodium restricted diets should consider the added sodium as part of their overall intake.

② IRON in water is measured in parts per million (ppm). The total* ppm of iron, and type or types*, are determined by chemical analysis. Four different types of iron in water are: [A] Ferrous (clear water), [B] Ferric (red water), [C] Bacterial and organically bound iron, [D] Colloidal and inorganically bound iron (ferrous or ferric).

*Water may contain 1 or more of the 4 types of iron and any combination of these. Total iron is the sum of the contents.

[A] Ferrous (clear water) Iron is soluble and dissolves in water. It is usually detected by taking a sample of water in a clear bottle or glass. Immediately after drawing, the sample is clear. As the water sample stands, it gradually clouds and turns slightly yellow or brown as air oxidizes the iron. This usually occurs in 15 to 30 minutes.

[B] Ferric (red water), and [C] Bacterial and organically bound irons are insoluble. This iron is visible immediately when drawn from a faucet because it has oxidized before reaching the home. It appears as small cloudy yellow, orange, or reddish suspended particles. After the water stands for a peri-

INTRODUCTION

continued from page 4 –

od of time, the particles settle to the bottom of the container. Generally, these irons are removed from water by filtration. Chlorination is also recommended for bacterial iron.

Ⓓ Colloidal and inorganically bound iron is a form of ferrous or ferric iron that will not filter or exchange out of water. In some instances, treatment may improve colloidal iron water, but always CONSULT A QUALIFIED WATER CHEMISTRY LAB before attempting to treat it. Colloidal iron water usually has a yellow appearance when drawn. After standing for several hours, the color persists and the iron does not settle, but remains suspended in the water.

Iron in water causes stains on clothing and plumbing fixtures. It negatively affects the taste of food, drinking water, and other beverages.

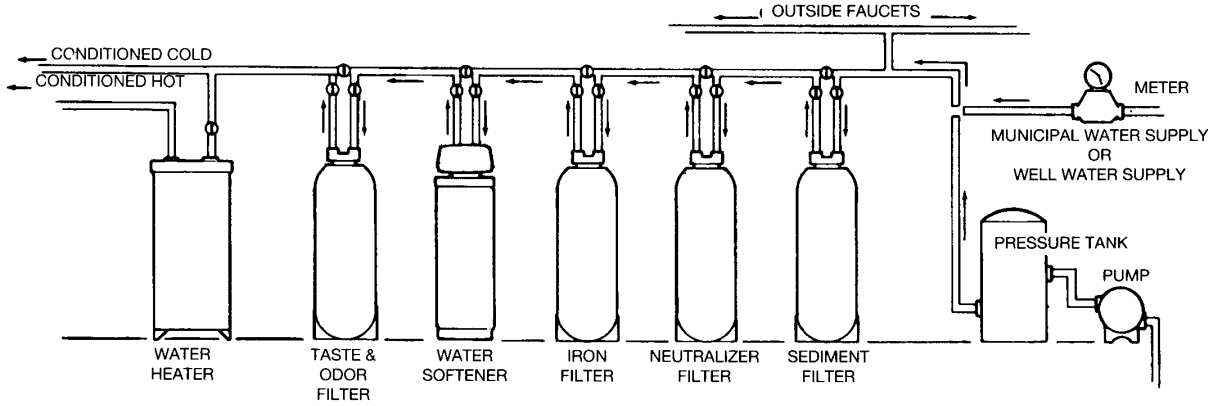
③ ACIDITY or acid water is caused by carbon dioxide, hydrogen sulfide, and sometimes industrial wastes. It is corrosive to plumbing, plumbing fixtures, water heaters, and other water using appliances. It can also damage and cause premature failure of seals, diaphragms, etc., in water handling equipment.

A chemical analysis is needed to measure the degree of acidity in water. This is called the pH of water. Water testing below 6.9 pH is acidic. The lower the pH reading, the greater the acidity. A neutralizer filter or a chemical feed pump are usually recommended to treat acid water.

④ SEDIMENT is fine, foreign material particles suspended in water. This material is most often clay or silt. Extreme amounts of sediment may give the water a cloudy appearance. A sediment filter normally corrects this condition.

COMPLETE WATER CONDITIONING SYSTEM – Seldom would all the water conditioners shown below be needed on 1 water supply. The drawing does show the proper sequence location of each conditioner. Note that only a taste and odor filter is installed after a water softener. All other filters belong before the water softener. Also note that outside faucet lines are before the treated water, and the water heater is after all conditioning.

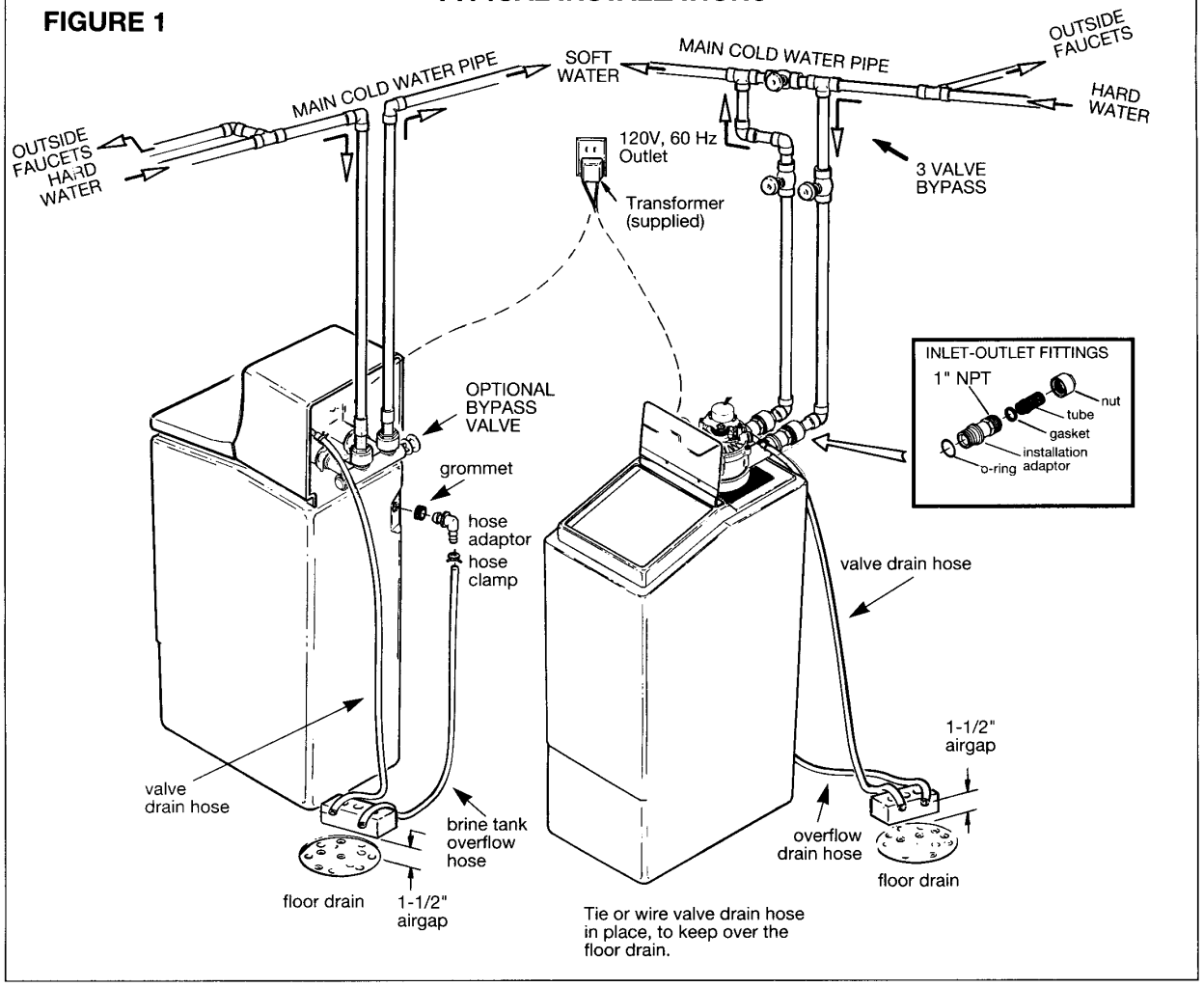
NOTE: FOR CLARITY OF THIS DRAWING, NOT ALL WATER CONDITIONERS ARE ILLUSTRATED (REVERSE OSMOSIS SYSTEMS, DISTILLERS, ETC.).



PLANNING INSTALLATION

TYPICAL INSTALLATIONS

FIGURE 1



INLET-OUTLET PLUMBING OPTIONS

1. ALWAYS INSTALL the optional bypass valve – part no. 7025954, or – a 3 valve bypass.

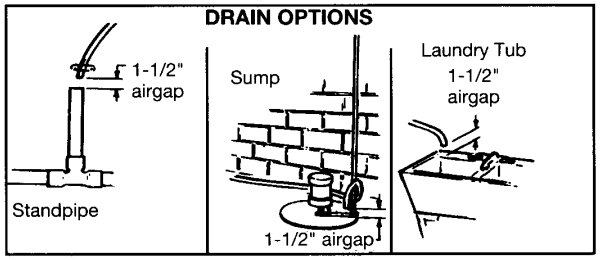
2. Use 1" – or – 3/4" (minimum) pipe and fittings.

3. Use sweat copper – or – threaded pipe – or – CPVC plastic pipe.

NOTE: The included copper installation tubes are 3/4". Threads on the installation adaptors are 1" NPT. Obtain the necessary plumbing adaptor fittings to connect to either the copper tubes or the installation adaptors, as desired. See the inset drawing in figure 1.

OTHER REQUIREMENTS

4. A drain is needed for regeneration discharge water. A floor drain, close to the water softener, is preferred. A laundry tub, sump, standpipe, etc., are other options.



5. A 120V-60Hz, grounded electrical outlet (continuously "live") is needed within 10' of the water softener.

PLANNING INSTALLATION

TOOLS YOU MAY NEED

- common screwdriver
- cross point screwdriver
- pliers
- tape measure

SOLDERED COPPER
- tubing cutter
- propane torch
- LEAD-FREE solder and flux
- emery cloth sandpaper or steel wool

THREADED
- hacksaw or pipe cutter
- threading tool
- pipe joint compound*

CPVC PLASTIC
- hacksaw
- adjustable wrench
- solvent cement*
- primer

*approved for use on potable water

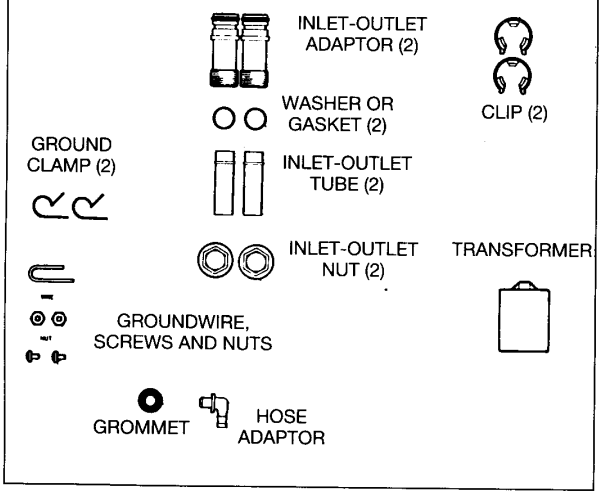
MATERIALS YOU MAY NEED

- bypass valve (see page 33), or 3 valves
- pipe and fittings as required
- 7/16" I.D. high quality, flexible hose for the valve drain*, and brine tank drain (see page 33).

*VALVE DRAIN OPTIONS: Flexible drain hose is not allowed in all localities (Check your codes.) For a rigid valve drain run, cut the barbed section off the drain fitting for access to the 1/4" pipe threads. Purchase a fitting, as needed, to adapt rigid tubing to the 1/4" threads (see parts page 33).

SMALL PARTS BAG

In addition to the owners manual, the parts bag includes the following.



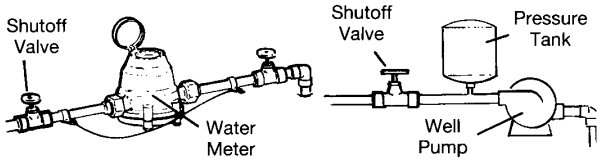
SELECT INSTALLATION LOCATION

Consider all of the following as an installation location for the water softener is selected.

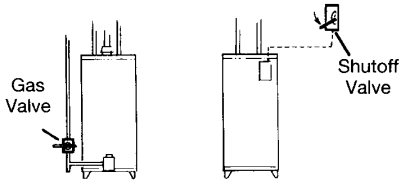
- To soften all water in the home, install the softener close to the water supply inlet, and before all other plumbing connections, EXCEPT FOR OUTSIDE WATER PIPES. Outside faucets should remain on hard water to avoid wasting soft water and salt (see drawing on page 6).
- A nearby drain is needed to carry away regeneration discharge water. A floor drain is preferred, with a laundry tub, sump, standpipe, etc. other possibilities (check your local codes).
- The water softener timer works on 24 volts only. A transformer is included to reduce 120V-60 Hz house electrical power. Provide an approved, grounded outlet within 10' of the softener. The softener includes a 10' power cable for connection between the transformer and the timer.
- Position the water softener at least 6" from surrounding walls, or other appliances, to allow access for adding salt and servicing.
- If other water conditioning equipment is installed, locate the water softener in the plumbing system as shown on page 5. ALWAYS INSTALL THE WATER SOFTENER BEFORE THE WATER HEATER (See Safety Guides on page 3). To reduce the risk of hot water back-up, soft water piping between the water softener and water heater should be as long as possible.
- Install the water softener in a place water damage is least likely to occur if it develops a leak.
- If installing the water softener in an outside location, be sure to provide protection from the elements, contamination, vandalism and sunlight heat. The sun's heat can melt plastic parts.

INSTALLATION

1. Close the shut-off valve on the house main water pipe, near the water meter or pressure tank, to turn off the water.



2. Shut off the gas or electric supply to the water heater.

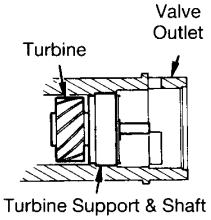


3. Open the highest and lowest water faucets in your house to let water drain from the pipes. Close faucets after water has drained.

4. If not already done, remove all cardboard or plastic packing pieces from inside the softener.

5. INSTALL INLET AND OUTLET ADAPTORS, OR THE OPTIONAL BYPASS VALVE.

IMPORTANT: On electronic demand models, be sure the turbine, turbine support and sensor housing are firmly in position, in or on the valve outlet.



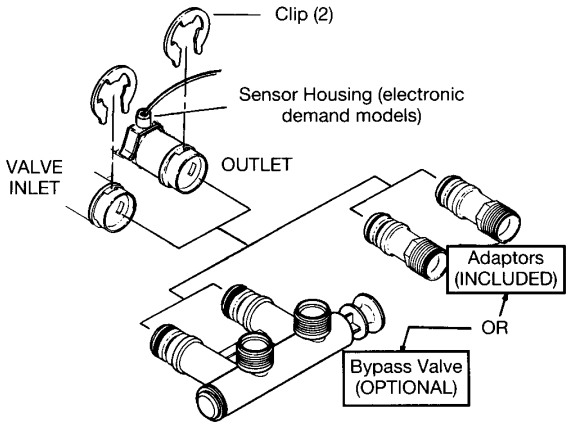
- INLET AND OUTLET ADAPTORS – Push adaptors into the valve ports. Be sure the o-ring seals are lubricated with silicone grease or Vaseline.

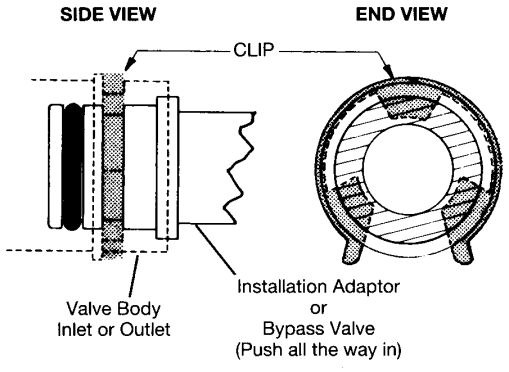
– OR –

BYPASS VALVE – Push the bypass valve into the valve ports (can be inverted for connecting to floor level plumbing). Be sure the o-ring seals are lubricated with silicone grease or Vaseline.

- **SNAP THE 2 LARGE HOLDING CLIPS INTO PLACE, FROM THE TOP DOWN AS SHOWN. BE SURE THEY SNAP FIRMLY INTO PLACE, SO THE ADAPTORS, OR BYPASS VALVE, DO NOT PULL OUT.**

FIGURE 2





NOTE: O-RING SEALS PLACED IN OUTER GROOVES ONLY. CLIPS SNAP INTO INNER GROOVES.

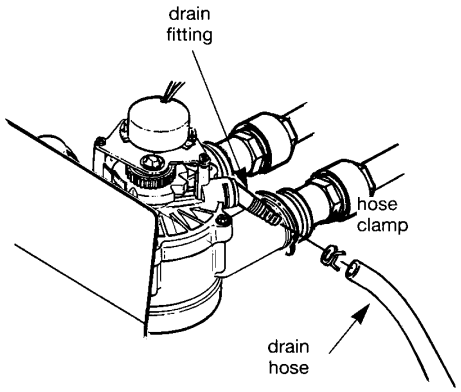
INSTALLATION

6. Move the softener into installation position, setting on a smooth and level surface. If needed, set it on a piece of 3/4" thick plywood (slightly larger than the bottom of the brine tank). Then shim under the plywood to level the softener.

7. Referring to page 6, run inlet and outlet pipes to the softener, observing all of the following notes.

- If the optional bypass valve is not used, be sure to use a 3-valve bypass as typically shown in figure 1.
- Be sure to plumb so HARD WATER flows TO the softener valve INLET.
- If sweat soldering, first disconnect copper pipes from plastic softener parts. **DO NOT SOLDER WITH COPPER CONNECTED TO THE SOFTENER OR PLASTIC PARTS WILL BE DAMAGED.**
- If using threaded fittings, use extreme care not to cross-thread onto plastic.
- Support inlet-outlet plumbing in some manner, to keep the weight off of the softener valve.

8. **CONNECT THE VALVE DRAIN HOSE**
Attach a length of 7/16" I.D. hose to the valve drain fitting. Use a hose clamp to hold it in place. Place the other end of the hose over a floor drain, into a laundry tub, sump, standpipe or other suitable drain (see page 6). BE SURE TO OBSERVE YOUR LOCAL CODES.

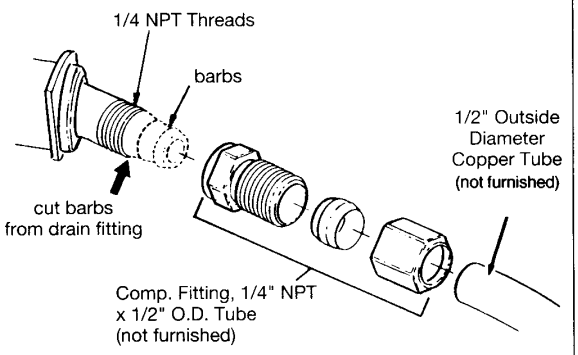


IMPORTANT NOTES:
Leave an air gap of about 1-1/2" between the end of the hose and the drain. This gap is needed so you don't get a back-flow of sewer water into the softener. DO NOT put the end of the hose into the drain or connect without the air gap.

Place and support the hose so it does not kink or have sharp bends. Tie or wire the hose in place so water pressure will not make it "whip." Do not pinch the hose shut. THE SOFTENER WILL NOT WORK IF THIS DRAIN HOSE IS PINCHED, PLUGGED OR CLOSED IN ANY WAY.

Keep the hose lower than the drain fitting. (In some homes, to get to a drain you must raise the hose and run it over-head. If you need an overhead drain, do not raise the hose more than 8' above the floor. A copper drain tube is best to use. . .see below.)

TYPICAL COPPER DRAIN TUBE CONNECTION
To adapt a copper drain tube to the softener, use a hacksaw to cut the barbed end from the drain fitting. Buy a compression fitting (1/4 in. female pipe threads x 1/2 in. O.D. tube) and tube from your local hardware store, or see page 33.



installation continued, page 10

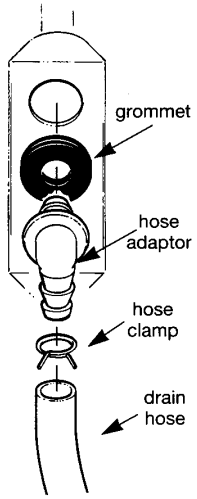
INSTALLATION

9. CONNECT BRINE TANK OVERFLOW HOSE

Insert the rubber grommet into the hole provided in the brine tank wall. Push the hose adaptor elbow into the grommet.

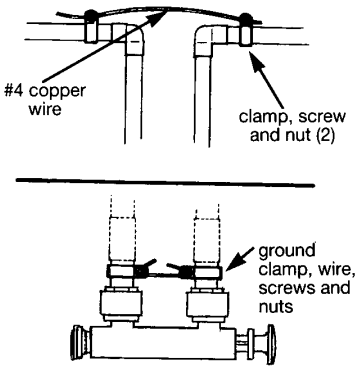
Attach a length of 7/16" I.D. hose to the drain elbow, securing with a clamp. Place the opposite end of the hose over the floor drain.

NOTE: This is a gravity drain. DO NOT ELEVATE THE HOSE HIGHER THAN THE HOSE ADAPTOR ELBOW.



10. The house cold water pipe (metal only) is often used as a ground for the house electrical system. The 3-valve bypass type of installation, shown in figure 1, will maintain ground continuity. If you use the plastic bypass valve at the water softener, continuity is broken. To restore the ground, install 1 of the following grounds.

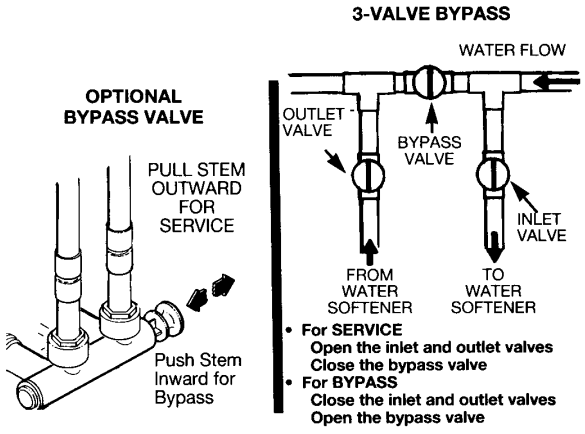
- Use the included "c" clamps and wire to jumper across the inlet and outlet copper tubes.
- Install a #4 copper wire across the removed section of main water pipe, securely clamping on both ends.



11. PRESSURE TESTING FOR LEAKS – TO PREVENT EXCESSIVE AIR PRESSURE IN THE WATER SOFTENER AND PLUMBING SYSTEM, DO THE FOLLOWING STEPS IN ORDER.

- Open 2 or more soft water faucets, both hot and cold.
- Referring to figure 3, move the bypass valve(s) to SERVICE position.
- SLOWLY OPEN THE MAIN WATER SUPPLY VALVE. When water from the faucets runs smoothly, with no air bubbles, close the faucets.
- Check your complete installation for leaks. If rework is required, be sure to observe precautions in step 7.

FIGURE 3



12. ADD WATER AND SALT INTO BRINE TANK

- Using a pail, or garden hose, add about 2 gallons of water into the brine tank. DO NOT POUR INTO THE BRINEWELL.
- **FILL THE BRINE TANK WITH SALT.** You can use most water softener salts, but it must be clean (recommended NUGGET or PELLET salt has less than 1% impurities). Salt storage capacity is shown on the specification page.

NOTE: See page 22 for additional salt information.

INSTALLATION

13. SANITIZING THE WATER SOFTENER

Care is taken at the factory to keep your water softener clean and sanitary. Materials used to make the water softener will not infect or contaminate your water supply, and will not cause bacteria to form or grow. However, during shipping, storage, installing and operating, bacteria could get into the water softener. For this reason, sanitizing, as follows, is suggested ① when installing.

. . .Remove the brinewell cover and pour about 1-1/2 oz. of common household bleach (Clorox, Linco, BoPeep, White Sail, Eagle, etc.) into the softener brinewell (see page 32). **REPLACE THE BRINEWELL COVER.**

① Recommended by the Water Quality Association. On some water supplies, the water softener may need periodic disinfecting.

14. CONNECT TO ELECTRICAL POWER

- Connect the power cable leads to the 2 terminals on the transformer.
- Plug the transformer into a continuously "live," grounded, 120V-60 Hz house electrical outlet, approved by local codes.

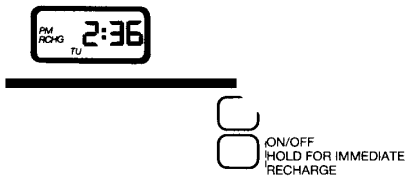
15. PROGRAM THE TIMER. . .page 12, solid state models, or page 15 electronic demand models. **AFTER PROGRAMMING, COMPLETE INSTALLATION STEPS 16, 17 AND 18 BELOW.**

16. START A RECHARGE

This initial recharge draws the sanitizing bleach (step 13) into and through the water softener, and purges any air remaining in the system. To start this recharge, which lasts for about 2 hours, do the following.

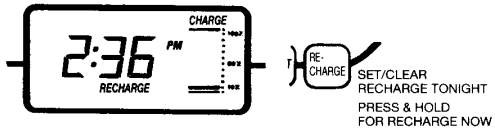
SOLID STATE

Press and hold in (for 3 seconds) the ON-OFF, HOLD FOR IMMEDIATE RECHARGE button, until RCHG begins to flash in the display.



ELECTRONIC DEMAND

Press and hold in (for 3 seconds) the RECHARGE button, until RECHARGE begins to flash in the display.



17. RESTART THE WATER HEATER

Turn on the electric or fuel supply to the water heater, and light the pilot, if applies.

NOTE: The water heater is filled with hard water and, as hot water is used, it refills with soft water. In a few days, the hot water will be fully soft. To have fully soft, hot water immediately, wait until the recharge (step 16) is over, then drain the water heater until water runs cold.

18. Install the top cover, then the salt fill hole cover.

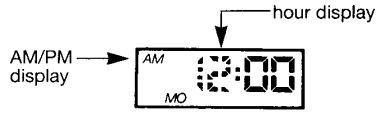
THE INSTALLATION IS COMPLETE.

PROGRAMMING THE SOLID STATE TIMER

■ When the transformer is plugged into the electrical outlet, 12:00 AM, SUnday begins to flash in the time display. Set the **time of day** and present **day of week** as follows:

1. SET TIME OF DAY

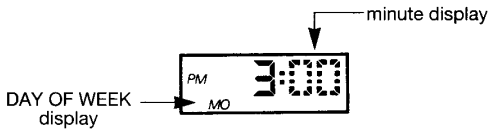
■ Press the TIME AND DAY button once. The hour display continues to flash.



■ Press the SET/CLEAR button until the present hour of the day shows in the display. Be sure AM for morning hours, or PM for afternoon and evening hours shows.

NOTE: Press SET/CLEAR and quickly release to move the hour display ahead 1 at a time to the correct hour. Or, **hold** the SET/CLEAR button to move the display ahead 2 hours each second, to the correct hour.

■ Press the TIME AND DAY button again to steady the hour display, and minutes begin to flash. Press SET/CLEAR until the correct minutes show in the display.



■ Press the TIME AND DAY button again to steady the minute display (day will begin flashing).

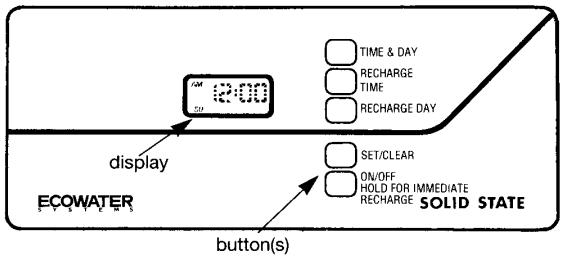
2. SET PRESENT DAY OF WEEK

■ Press the SET/CLEAR button to set the present day of the week in the display.

NOTE: Press SET/CLEAR and quickly release to move the day display 1 at a time. Or, **hold** the SET/CLEAR button to move the day display ahead 2 days each second.

■ Press the TIME AND DAY button again to steady the entire display.

NOTE: The timer is factory set to regenerate ① ,

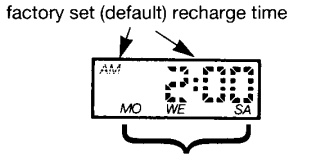


beginning at 2:00 AM (RECHARGE TIME), every Monday, Wednesday and Saturday (RECHARGE DAYS). For most families, this provides enough soft water for their needs. To schedule a different RECHARGE TIME, or different RECHARGE DAYS and **FILL** cycle time, see the regenerations table on page 13. Then, continue below.

3. CHANGE RECHARGE TIME

■ Press the RECHARGE TIME button once, to display the factory set regeneration days and starting time (flashing). To change the regeneration start time, do the following. Otherwise, go to step 4.

■ Press the SET/CLEAR button until the desired regeneration starting time shows the display.



NOTE: Press SET/CLEAR and quickly release to move the display ahead 1 hour at a time. Or, **hold** the SET/CLEAR button to move the display ahead 2 hours each second.

4. CHANGE RECHARGE DAYS

■ Press the RECHARGE DAY button and SUnday begins to flash.

. . .If you **want** regenerations on Sunday (from regeneration table, page 13), press the SET/CLEAR button to display **ON**.

continued

① REGENERATE and RECHARGE mean the same. The process is explained on page 20.

PROGRAMMING THE SOLID STATE TIMER

- . . .If you **do not want** Sunday regenerations, press SET/CLEAR button to display **OFF**.

- Press the RECHARGE DAY button again to display a flashing MOnday and **ON** (factory set recharge). As you did above, use the SET/CLEAR button to change the display to **OFF**, if desired.
- Press the RECHARGE DAY button to display a flashing TUesday, WEdnesday, etc., each time using the SET/CLEAR button to display either ON or OFF as needed.

After recharge is either set or cancelled for SAturday, press the TIME AND DAY button **once** again to return the present time and day display.

5. CHANGE FILL CYCLE MINUTES (FACTORY SET FOR 8 MINUTES).

- Press and **hold** the RECHARGE TIME button until FILL shows in the display, then release button. After a few seconds, the fill cycle minutes (factory setting. . .8) will flash.

- Press the SET/CLEAR button to set the minutes of fill cycle needed, as shown in the regeneration table. **NOTE:** AFTER PASSING 59, THE DISPLAY BEGINS OVER AT 0.
- Press TIME AND DAY button to return the present time and day display.

NOTE: The timer default cycle time settings, in addition to the 8 minute fill cycle are...brining and brine rinse - 80 min., backwash - 12 min., and fast rinse - 3 min.

continued, page 14

REGENERATION TABLE

1 Calculate the weekly grains capacity required.

Water Usage (Gals.) ① – Daily – _____ X 7 = Water Usage (Gals.) – Weekly – Gallons Weekly _____ X Water Hardness ② _____ = Grains Capacity Required Weekly

① If water usage is unknown, use 60 gallons per person in the household, per day.

② If water contains iron, add to water hardness at ratio of 5 grains per 1 ppm iron.

2 Select number of regenerations, and fill minutes each regeneration, to obtain weekly capacity.

MODEL	WEEKLY CAPACITY (Grains)								
	1 REGEN.	④ LBS SALT	③ FILL MIN.	2 REGEN.	3 REGEN.	4 REGEN.	5 REGEN.	6 REGEN.	7 REGEN.
511	4900	1.1	4	9800	14700	19600	24500	29400	34300
	5900	1.4	5	11800	17700	23600	29500	35400	41300
	6900	1.6	6	13800	20700	27600	34500	41400	48300
	8600	2.2	8	17200	25800	34400	43000	51600	60200
	9500	2.7	10	19000	28500	38000	47500	57000	66500
514	9800	1.9	7	19600	29400	39200	49000	58800	68600
	11100	2.4	9	22200	33300	44400	55500	66600	77700
	13000	3.2	12	26000	39000	52000	65000	78000	91000
	14200	3.8	14	28400	42600	56800	71000	85200	99400
	15800	4.6	17	31600	47400	63200	79000	94800	110600
518	11600	2.2	8	23200	34800	46400	58000	69600	81200
	13500	3.0	11	27000	40500	54000	67500	81000	94500
	15400	3.8	14	30800	46200	61600	77000	92400	107800
	17000	4.6	17	34000	51000	68000	85000	102000	119000
	19400	5.7	21	38800	58200	77600	97000	116400	135800

③ Calculate capacities for fill minute settings between those listed.

NOTE: The above capacities are for reference only, while setting the softener for recharge(s). See the rating decal on the softener, for Water Quality Association (WQA) validated capacities and salt usages.

Minutes of FILL

3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
.8	1.1	1.4	1.6	1.9	2.2	2.4	2.7	3.0	3.2	3.5	3.8	4.0	4.3	4.6	4.8	5.1	5.4	5.7

Pounds of SALT ④

④ *Fill Flow (.1 GPM) x Fill Minutes x 2.7 (lbs. salt dissolved by 1 gal. water) = Salt Used Each Regen.*

SOLID STATE TIMER FEATURES AND OPTIONS

6. CHANGE BRINING, BACKWASH AND FAST RINSE MINUTES

- Refer to the service information table, on page 31, for suggested cycle time lengths. Then, turn to page 24 and follow steps to change the times, if desired.

RETURN TO STEP 16, PAGE 11, AND COMPLETE THE INSTALLATION STEPS.

DOUBLE BACKWASH – The double backwash is beneficial on some kinds of iron bearing water. When set, backwash and fast rinse cycles occur both before and after brining. To set. . .

1. Press and **hold** SET/CLEAR until 18:88 shows in the display.

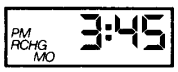
2. Press TIME AND DAY to display 3 dashes.

3. Press SET/CLEAR to display **dbl.**
4. Press TIME AND DAY to display 18:88.

5. Press SET/CLEAR to return present time.

To **cancel** double backwash, repeat the above steps. Displays for **dbl** and - - - occur in reverse order.

RECHARGE NOW – If you have guests visiting, or other times when you use more water than usual, you could begin to run out of soft water. If the water softener is not scheduled to regenerate for another day or 2, you would get hard water until then. If this happens, or you think it might happen, press and hold in the ON-OFF, HOLD FOR IMMEDIATE RECHARGE button for 3 seconds until **RCHG** shows. **RCHG** will flash in the display during the regeneration, which lasts for about 2 hours.



NOTE: Avoid using HOT water while the water softener regenerates, because bypass hard water will refill the water heater.

VACATION – The day you leave on vacation, or other long absence, press (DO NOT HOLD IN) the ON/OFF button. **VAC** begins to flash in the display. The timer will keep time, but the water softener will not regenerate to waste water and salt.

NOTE: While in VACATION, the water softener **will** go through a regeneration if the RECHARGE NOW feature is used (see above).

WHEN YOU RETURN, press the ON/OFF button again to return the water softener to service, and the correct time of day in the display. **Remember to do this or the water softener will not regenerate and you will soon have hard water.**

TIMER "POWER-OUTAGE MEMORY" – If electrical power to the timer goes off, the "memory" built into timer circuitry keeps **all** settings for 6 hours (minimum) or more. The display is blank and the water softener will not regenerate. When electrical power comes on, 1 of 2 things will happen.

1. The present time of day will show, meaning the timer memory has kept all settings.

NOTE: *If the water softener was* ***in*** *a regeneration when power was lost, it will now finish the cycle.*

2. The display will show a time, but it will be flashing. The timer memory did **not** keep the time settings and they must be reset.

The flashing display is to remind you to reset the timer.

NOTES:

When power comes on, the flashing display returns to a time of 12:00 AM Sunday, then begins to keep time again. If you do not reset all time settings, the water softener will regenerate 3 days each week. However, regeneration will most likely be on the wrong days and at the wrong time.

If the water softener was in a regeneration when power went off, the valve will return to service position without finishing the regeneration cycle. If your water tastes salty . . .

. . . use RECHARGE NOW to start another regeneration, or . . .

. . .open 1 or more soft water faucets and allow to run until the salt taste is gone.

PROGRAMMING THE ELECTRONIC DEMAND TIMER

When the transformer is plugged in, the face plate display shows 5 dashes, followed by a test number (example: 5.0), and the 5 dashes again.

NOTE: IF 12:00 AM IS FLASHING, THE MODEL CODE. . .STEP 1, WAS FACTORY SET. GO DIRECTLY TO STEP 2. (See page 28 to check the model code setting.)

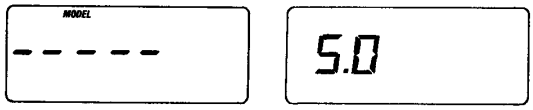
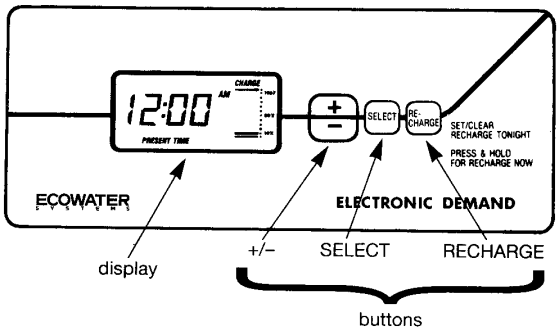


FIGURE 5



1. SET THE MODEL CODE: Locate the softener model number on the rating decal, under the salt lid, on the brine tank. Then, obtain the model code from the model code table. Press the (+) button until this code appears. If you pass by the correct code, use the (–) button. BE SURE TO SET THE CORRECT CODE, OR THE WATER SOFTENER WILL OPERATE ON INCORRECT TIMING.

MODEL CODE TABLE

MODEL NUMBER (on rating decal)	MODEL CODE
500 ED 511	**511**
500 ED 514	**514**
500 ED 518	**518**

When you are certain the correct code appears, press SELECT to set. A test number (example: 5.0) will show again for a few seconds, followed by a flashing 12:00 a.m. The charge bar will show 0%, until after the first regeneration (see page 16).

NOTES:

- To change the model code, see page 28.
- Whenever the model code is changed, all timer programming reverts to factory default values. Be sure to reset the timer, including backwash and fast rinse times shown in the service information table, page 31. See pages 17 and 18 to reset.

- **SOUND "BEEPER"** – A "beeper" sounds while pressing buttons for timer set-up. One beep signals a change in the face plate display. Repeated beeps means the timer will not accept a change from the button you have pressed, telling you to use another button. For example, while setting the hardness, the beeper sounds repeatedly when the display reaches 1 using the (–) button, and 95 using the (+) button.

2. SET THE PRESENT TIME: Again, use the (+) or (–) to set the present time of day, being sure a.m. or p.m. shows, as required. Press (+) to move the time ahead; press (–) to move the time backward. **NOTE:** Each press of the (+) or (–) button changes the time by 1 minute. Holding a button in, changes the time 32 minutes each second.

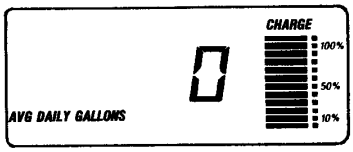
NOTE: TO RESET THE PRESENT TIME, IF FLASHING AFTER A POWER OUTAGE, DO STEP 2. Then, press SELECT 4 times to steady the display.

PROGRAMMING THE ELECTRONIC DEMAND TIMER

3. SET WATER HARDNESS: Press SELECT button once to display a flashing 15 and HARDNESS. Set the grains per gallon hardness of your water supply (determined by water analysis or call your local water department). Use the (+) button to advance the number; use the (–) button to reduce the number. Each press of a button changes the display by 1, between 1 and 25. Between 25 and 95 the display changes 5 at a time. Hold the buttons in for fast number advance. **NOTE:** To compensate for iron in the water supply, add 5 to the hardness number for each 1 ppm of iron.

4. SET RECHARGE (REGENERATION) TIME: Press SELECT to display a flashing 2:00 a.m. and RECHARGE TIME. At this setting, the water softener begins recharge or regeneration at 2:00 a.m., ending no later than 4:30 a.m. This is a good time in most households, because water is not being used. (If hot water is used while the softener is regenerating, the water heater will refill with hard water.) To select a different recharge start time, use the (+) or (–) button.

5. Press SELECT to display AVERAGE DAILY GALLONS (no adjustments), then press SELECT once more to return the present time of day.



RETURN TO STEP 16, PAGE 11,
TO COMPLETE THE INSTALLATION STEPS.

FEATURES AND OPTIONS

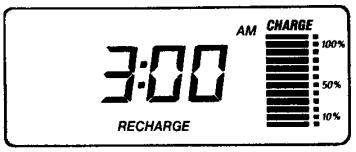
CHARGE BAR DISPLAY

The charge bar is continually displayed and shows, at a glance, the percentage of soft water capacity remaining. After a recharge or regeneration, the charge bar returns to the 100% charge position.

NOTE: When electrical power is applied to the timer, the charge bar is at 0% until after the initial regeneration.

FLASHING "RECHARGE"

While the water softener is in a recharge cycle, the word "RECHARGE" flashes in the display until the softener returns to soft water service.

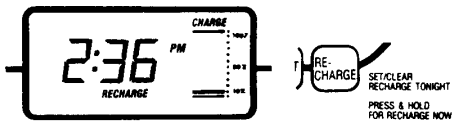


FLASHING "RECHARGE" TONIGHT

When the face plate computer determines that a recharge is needed to restore soft water capacity, it initiates "RECHARGE TONIGHT." At the next programmed recharge start time, the recharge cycle will begin. Flashing RECHARGE then replaces the flashing RECHARGE TONIGHT.

INITIATING EXTRA RECHARGES

1. RECHARGE NOW: Press and hold the RECHARGE button for 3 seconds, until RECHARGE begins to flash in the display. A recharge begins immediately.



ELECTRONIC DEMAND TIMER FEATURES AND OPTIONS

RECHARGE NOW – continued

To assure an adequate supply of soft water, at times of unusual or unexpected high water use demand, use the RECHARGE NOW feature. For example, if you have guests and the charge bar is at or below 50%, you could deplete the soft water capacity before the next recharge is automatically initiated. To be sure this will not happen, use RECHARGE NOW to restore 100% soft water capacity when the recharge is over.

2. RECHARGE TONIGHT: Press and immediately release the RECHARGE button. RECHARGE TONIGHT will flash in the display. When this feature is set, the water softener will regenerate at the next programmed recharge start time. This feature is beneficial to assure a sufficient conditioned water supply for an expected heavy water usage the next day.

To cancel a recharge when RECHARGE TONIGHT is flashing, press and immediately release the RECHARGE button.

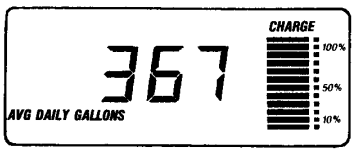
PROGRAM MEMORY

If electrical power to the water softener goes off, the time display is blank, but the face plate timer keeps the correct time for at least 2 days. When electrical power comes on again, you have to reset the present time only if the display is flashing. The MODEL CODE, HARDNESS and RECHARGE TIME never require resetting unless a change is desired.

Even if the timer is incorrect after a long power outage, the water softener works as it should to keep your water soft. However, regenerations may occur at the wrong time of the day until you reset the timer to the correct time of day. To reset present time, see step 2 on page 15.

AVERAGE DAILY GALLONS

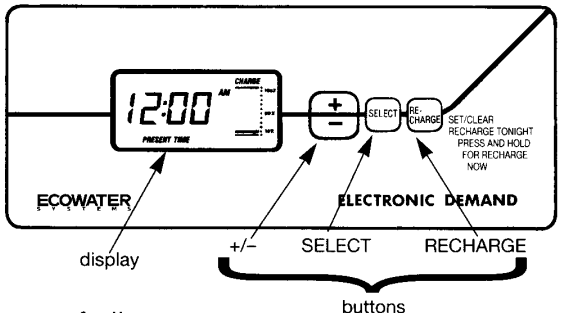
If you want to know the average gallons of water your household uses each day, press the SELECT button 4 times to display this water use fact. The average daily gallons is based on your past 7 days of water usage. The figure adjusts daily at midnight. Press SELECT once more to return the present time (or present time automatically returns in 4 minutes).



THE FOLLOWING FEATURES AND OPTIONS ARE SELECTED OR OBSERVED IN A **SECONDARY TIMER MODE**. SOME OF THESE MAY BE BENEFICIAL TO THE HOME-OWNER, AND OTHERS TO THE SERVICE TECHNICIAN. SOME FEATURES ARE USEFUL TO BOTH OWNER AND SERVICER. EACH FEATURE IS LISTED IN THE ORDER THAT DISPLAYS APPEAR WHEN PASSING THROUGH THE SECONDARY MODE.

NOTE: The present time display will return if more than 4 minutes pass without touching a face

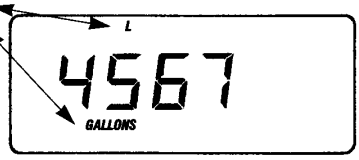
TO ENTER THE SECONDARY MODE. . .Press SELECT and **hold** for 3 seconds.



1. GALLON (OR LITER) TOTAL COUNT: This is a measure of all water that has passed through the water softener since installation. The display will total up to 99,999 gallons before beginning over at 0.

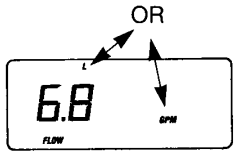
NOTE: When in this display, the total can be returned to 0 by pressing the (–) button.

OR



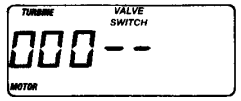
ELECTRONIC DEMAND TIMER FEATURES AND OPTIONS

2. FLOW RATE, GALLONS (OR LITERS) PER MINUTE: Press SELECT once more to access this display. The display shows the flow rate, in gallons (or liters), passing through the water softener. If all water-using appliances and faucets are off, the display will be 0. This display indicates positive water meter turbine operation.



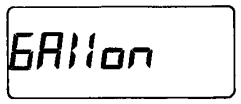
3. OPERATING CAPACITY: Press SELECT to view the current operating capacity of the softener. The display alternates between CAP and (example: 15400). Upon installation, capacity shown is the medium operating level of the softener. After that, depending on water usage (see page 19), the actual grains capacity recharged displays.

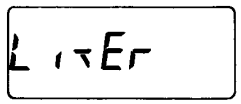
4. VALVE SWITCH, TURBINE, AND MOTOR DIAGNOSTIC: Press SELECT again for this diagnostic display. FOR ADDITIONAL INFORMATION ON THIS DISPLAY, PLEASE SEE PAGE 28.



5. 12 OR 24 HOUR CLOCK: Press SELECT to display a flashing 12 hour (or 24 hour). When "12 hour" is set, the present time and recharge time displays are shown in standard clock time...1 to 12 p.m., 1 to 12 a.m. Military time, 0100 (1:00 a.m.) to 0000 (midnight), is shown in the present time and recharge time displays when "24 hour" is set. Use the (+) or (-) buttons to set the desired clock.

6. GALLONS OR LITERS MEASURE: Press SELECT to show either GALLON or LITER flashing. If GALLON is selected, all water flow rate or usage displays are shown in gallons or gallons per minute. If LITER is selected, the same displays are in liters or liters per minute. The (+) or (-) button is used to change this display.



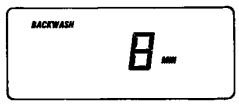


7. MAXIMUM DAYS BETWEEN RECHARGES: Press select to display AUTO, or 1 day, 2 day, etc. through 7 day. The AUTO setting allows the face plate computer to control **all** recharges, with intervals based on water usage. AUTO provides the most economical softener operation. To set a maximum time (in days) between recharges, use the (+) or (-) buttons. For example, if you select **5 day** in the display, the timer will assure that no more than 5 days will pass without a recharge.

   NOTE: If the 24 hour clock is selected (setp 5, above), an alternating OFF/97 will display when SELECT is pressed. This feature is mainly for the European market, which requires **immediate** recharge when 97% of the softening capacity is used. To select this feature, press the (+) button to display ON.

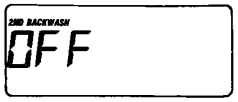
8. BACKWASH MINUTES: Press SELECT and a flashing MIN./BACKWASH time shows in the display. Recommended backwash time is shown in the service information table, page 31. To set this time, or up to a maximum of 30 minutes, if desired, use the (+) and (-) buttons. Default time is 7 or 8 minutes, depending on the model code.

   NOTE: The length of each stage (fill, brining and brine rinse, backwash, fast rinse) of the recharge cycle is automatically controlled by the face plate computer. This time is computed based on water usage, water hardness, size of the softener resin bed, etc.



ELECTRONIC DEMAND TIMER FEATURES AND OPTIONS

9. 2ND BACKWASH: Press SELECT again to display 2ND BACKWASH/OFF. Two backwash cycles are beneficial on some water supplies, especially if it has high sediment or iron content. When selected, a backwash and fast rinse cycle will follow the fill cycle of recharge. Then the normal recharge sequence (brining, brine rinse, backwash, fast rinse) resumes. To select the 2nd backwash, press the (+) to display ON, or press (-) button to change from ON to OFF.



10. RINSE MINUTES: Press SELECT and a flashing MIN./RINSE time shows in the display. Recommended rinse time is shown in the service information table, page 31. To set this time, or up to a maximum of 30 minutes, if desired, use the (+) and (-) buttons. Default time is 3 minutes.

PRESS SELECT ONCE MORE TO RETURN THE PRESENT TIME DISPLAY.

NOTE: ALSO SEE SERVICE INFORMATION, PAGES 27 THROUGH 29.

DEMAND MODEL, ELECTRONIC OPERATION

WATER METER:

The water meter, consisting of a turbine, turbine mounting assembly, and the sensor housing, is located at the valve outlet port (see step 5 and figure 2, page 8). As water passes through and spins the turbine, 2 magnets (in the turbine) cause a back-and-forth movement of a switch in the sensor housing. This switch movement sends a pulse to the electronic demand timer.

ELECTRONIC DEMAND TIMER:

The demand timer is actually a small computer. As it receives pulses from the water meter, it converts them to gallons of water passing through the water softener. It multiplies this water usage information times the water hardness (preprogrammed into timer) to continually calculate the soft water capacity required. The computer adjusts daily to water using habits, seeking to supply soft water for the longest time, using the least (and most efficient) amount of salt and water to regenerate.

When the computer determines more capacity is needed, at the next regeneration starting time (2:00 a.m., or as otherwise preset), it will schedule a regeneration. RECHARGE TONIGHT shows in the display to inform of the coming regeneration.

HOW THE WATER SOFTENER WORKS

The water softener is filled with a man-made resin material. It is called the resin bed. The resin looks somewhat like coarse sand, but the beads are round and smooth. This resin has the ability to remove hardness minerals from water by ion-exchange.

SERVICE, AND REGENERATION

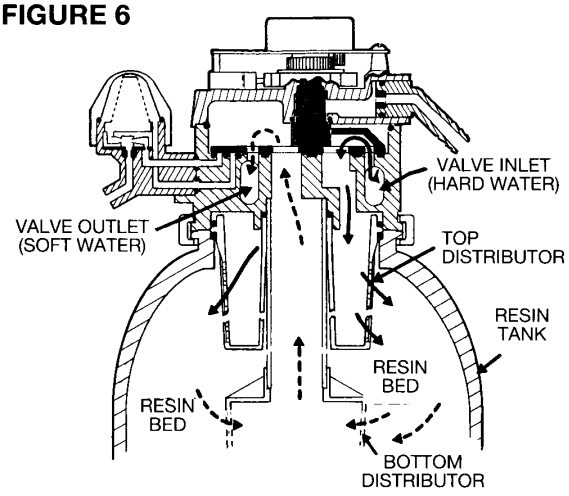
SERVICE (FIGURE 6):

Hard water enters the valve inlet port. Internal valve porting routes the water down and out the top distributor, into the resin tank. Hard water is softened as it passes through the resin bed, then enters the bottom distributor. Soft water flows back into the valve and out the valve outlet, to the house soft water pipes.

In time, the resin beads become coated with hardness minerals and cleaning with a salt solution (brine) is needed to remove it. Regeneration, and recharge, are words used to describe this cleaning.

SERVICE CYCLE

FIGURE 6



REGENERATION, OR RECHARGE

The face plate-timer determines when a regeneration is needed (see page 12 or 19). Regeneration starts at 2:00 a.m., or other preselected time, and consists of 5 different steps, or cycles.

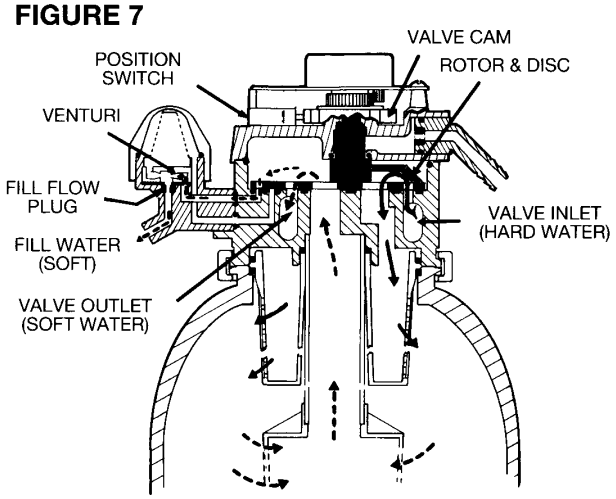
NOTE: See the service information table, page 31, for regeneration cycle times.

STEP 1 – FILL CYCLE (FIGURE 7): Salt, dissolved in water, is called brine. Brine is the cleaning agent for the resin bed. To make brine, water is needed in the brine tank salt storage area. A controlled water flow to the brine tank takes place during fill.

The timer energizes the circuit to the valve motor. The valve motor rotates the rotor and disc and the valve cam until the position switch lever drops, to open the motor circuit and position the valve in FILL. As the rotor and disc rotates, the port opens for SOFT water fill through the venturi. Fill flow continues to the brine valve, and into the brine tank. Soft water is still available to the house lines.

FILL CYCLE

FIGURE 7



STEP 2 – BRINING CYCLE, and STEP 3 – BRINE RINSE CYCLE (FIGURE 8):

After fill, timer/switch action allows the motor to turn the rotor and disc into BRINING position. Water flow is directed to the nozzle. Suction, created by the nozzle and venturi, draws brine from the brine tank and injects it into the resin bed via the bottom distributor. Flow continues out the top distributor and to the drain. Hard water is available at the valve outlet.

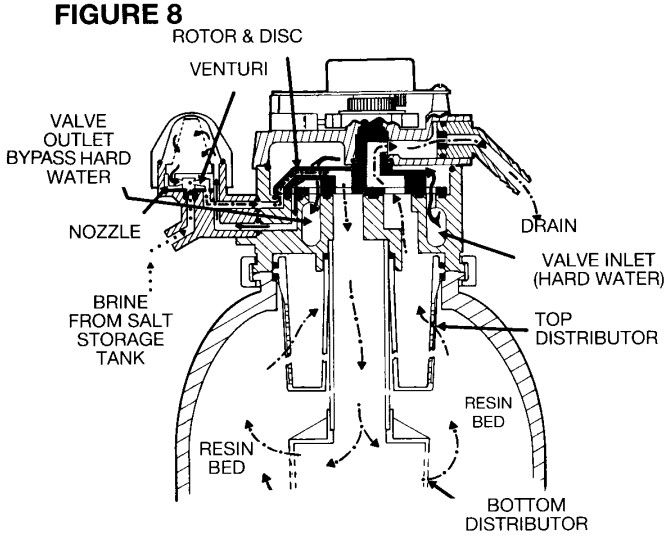
HOW THE WATER SOFTENER WORKS

BRINING, BRINE RINSE – continued

When the brine valve closes to end brine draw, water flow continues in the same directions to slowly RINSE brine from the resin bed and to the drain.

BRINING AND BRINE RINSE CYCLES

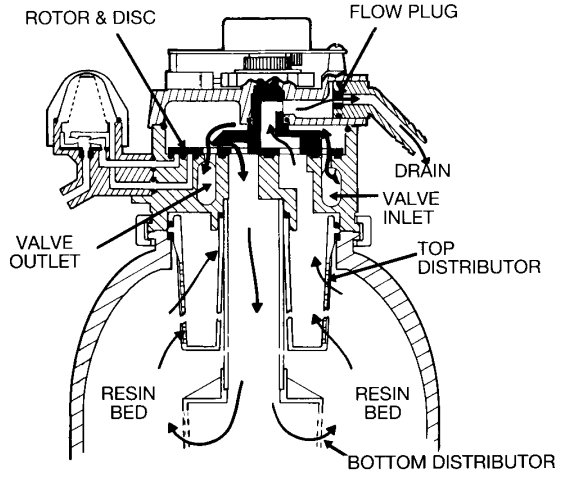
FIGURE 8



STEP 4 – BACKWASH CYCLE (FIGURE 9):
Timer/switch action again allows the motor to turn the rotor and disc to place the valve in BACKWASH, stopping water flow to the nozzle. Water is routed down and out the bottom distributor, up through the bed, and out the top distributor to the drain. The fast flow (controlled by a flow plug in the drain fitting) flushes dirt, sediments, iron deposits, remaining brine and hardness to the drain.

BACKWASH CYCLE

FIGURE 9

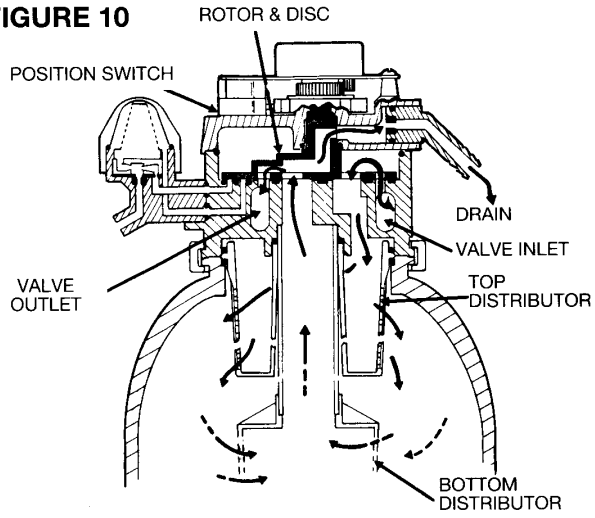


STEP 5 – FAST RINSE CYCLE (FIGURE 10):
During FAST RINSE, the rotor and disc is positioned so water flow enters the resin tank through the top distributor, and exists through the bottom distributor, to the drain.

The timer again energizes the motor to return the valve to service. As the valve rotates, the position switch lever drops to open the circuit. The valve remains positioned in service until the timer initiates the next regeneration.

FAST RINSE CYCLE

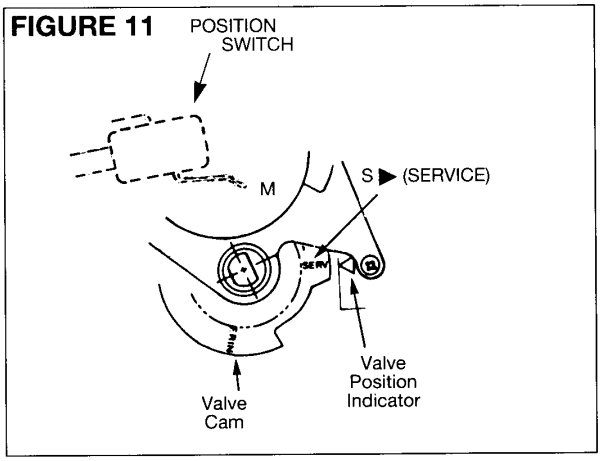
FIGURE 10



BYPASS HARD WATER: During brining, brine rinse and backwash, hard water is bypassed through the valve and available at house faucets. Avoid using HOT water however, because the water heater will refill with hard water.

VALVE CYCLE POSITION INDICATOR

FIGURE 11



SERVICE INFORMATION

REFILLING WITH SALT

Remove the brine tank cover and check the salt storage level frequently. If the water softener uses all the salt, before you refill it, you will get hard water. Until you have established a refilling routine, check the salt level at least every 2 or 3 weeks. Always refill if less than 1/2 full. BE SURE THE BRINEWELL COVER IS ON.

RECOMMENDED SALT: Nugget, pellet, button, etc. water softener salt is recommended. This type of salt is formed, or compressed into briquets, from high purity evaporated crystals. It has less than 1% insoluble (will not dissolve in water) impurities. Clean, high grade solar or rock salts are acceptable, but may require frequent brine tank cleaning to remove the "sludge" residue (insolubles).

SALT NOT RECOMMENDED: Rock salt, high in impurities, block, granulated, table, ice melting, ice cream making salts, etc., are not recommended.

SALT WITH IRON REMOVAL ADDITIVES: Some salts have an additive to help the water softener handle iron in the water supply. Although this additive may help keep the softening resin clean, it may also release corrosive fumes that will weaken and shorten the life of some softener parts.

BREAKING A SALT BRIDGE

Sometimes, a hard crust or salt bridge forms in the brine tank. It is usually caused by high humidity or the wrong kind of salt. When the salt bridges, an empty space forms between the water and salt. Then salt will not dissolve in the water to make brine. Without brine, the resin bed does not regenerate and you will have hard water.

If the brine tank is full of salt, it is hard to tell if you have a salt bridge. Salt is loose on top, but the bridge is under it. Take a broom handle, or like tool, and push it straight down into the salt. If a hard object is felt, it's most likely a salt bridge. Carefully push into the bridge in several places to break it.

NOTE: In humid areas, it is best to keep the salt storage level lower, and to refill more often.

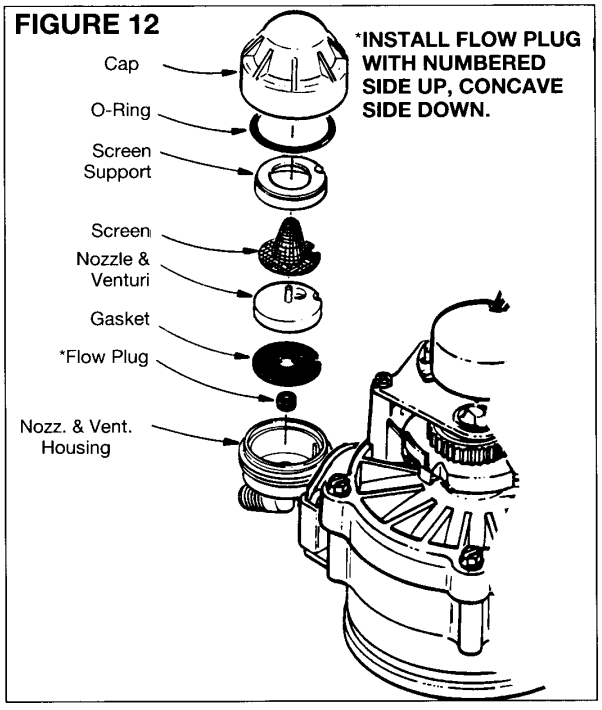
CLEANING THE NOZZLE & VENTURI

A clean nozzle and venturi (figure 12) is a must for the water softener to work right. This small unit moves brine from the brine tank to the resin tank during regeneration. If it becomes plugged with sand, silt, dirt, etc., the resin bed will not be regenerated and you will get hard water.

To get to the nozzle and venturi, remove the salt fill cover and top cover. Be sure the softener valve is in service cycle (no water pressure at nozzle and venturi), then turn off the cap from the nozzle and venturi housing. DO NOT LOSE THE LARGE O-RING SEAL. Lift out the screen support and screen, then the nozzle and venturi. Wash and rinse the parts in warm water until clean. If needed, use a small brush to remove iron or dirt. Also check and clean the gasket and flow plug if dirty.

Carefully replace all parts in the correct order. Lubricate the o-ring seal with silicone grease or Vaseline and place in position. Install and tighten the cap, BY HAND ONLY. DO NOT OVERTIGHTEN AND BREAK THE CAP OR HOUSING.

FIGURE 12



SERVICE INFORMATION

RESIN BED CLEANING

If the water supply contains "clear water" iron (see page 4), regular resin bed cleaning is needed to keep the resin bed from coating with iron. Use resin bed cleaner for water softeners, following directions on the container. Clean the resin every 6 months, or more often if iron appears in your soft water supply.

ADDING RESIN

Normally, the resin bed (see figure 13) will last the lifetime of the water softener. However, certain conditions may require the resin bed to be partially or totally replaced. Some of these conditions are:

(1) damaged top and/or bottom distributors have allowed resin to escape

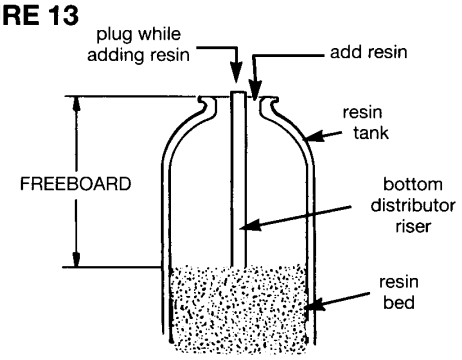
(2) resin bed iron fouled beyond use

(3) some water supplies cause resin degradation

To add more resin, or to replace the entire bed, use the following guide. (See resin requirements, page 31.)

MODEL NUMBER	RESIN TANK SIZE	FREEBOARD RANGE	LBS. RESIN PER INCH BED DEPTH
511	8" dia. x 19"	0"-3"	1.2
514	8" dia. x 25"	0"-3"	1.2
518	8" dia. x 35"	5½"-7½"	1.2

FIGURE 13



IMPORTANT NOTES:

TURN OFF THE WATER SUPPLY AND RELIEVE PRESSURE (SEE BELOW).

HANDLE THE RESIN TANK CAREFULLY. IT IS HEAVY WHEN FULL OF RESIN AND WATER.

DO NOT LOSE ANY O-RING SEALS OR OTHER SMALL PARTS.

CAUTION: ALWAYS RELIEVE WATER PRESSURE IN WATER SOFTENER, as follows, before removing parts from the valve or resin tank.

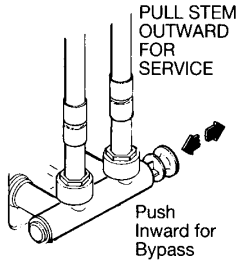
DEPRESSURIZE

1. Put bypass valve(s) in bypass position.
2. Do MANUAL ADVANCE steps. . .
   . . . 1-3, page 25 – Solid State models.
   . . . 1, page 29 – Electronic Demand models.
   } (fill water to brine tank depressurizes resin tank)

REPRESSURIZE

1. Put bypass valve(s) in service position.
2. Do MANUAL ADVANCE steps. . .
   . . . 4-9, page 25 – Solid State models.
   . . . 2-5, page 29 – Electronic Demand models.

OPTIONAL BYPASS VALVE



ALTERNATE METHOD

3-VALVE BYPASS

DEPRESSURIZE

1. Close the INLET valve.
2. Open HOT and COLD soft water house faucets.
3. Close OUTLET valve and open BYPASS valve.
4. Close house faucets.

PRESSURIZE

1. Open HOT and COLD house faucets.
2. Close BYPASS valve and open OUTLET valve.
3. Slowly open INLET valve.
4. Close house faucets.

OPTIONAL BYPASS VALVE

DEPRESSURIZE – (ALSO SEE PAGE 30)

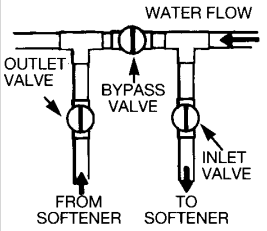
1. Close the house main water supply valve.
2. Open HOT and COLD soft water house faucets.
3. Slide stem inward to bypass position.

NOTE: For hard water bypass to house faucets, reopen the main water supply valve.

PRESSURIZE

1. Open HOT and COLD house faucets (main water supply valve open).
2. Pull bypass valve stem outward to service position.
3. Close house faucets.

3-VALVE BYPASS



- **For SERVICE**
  Open the inlet and outlet valves
  Close the bypass valve
- **For BYPASS**
  Close the inlet and outlet valves
  Open the bypass valve

SERVICE INFORMATION, SOLID STATE TIMER MODELS

REGENERATION CYCLE TIMES

The factory set (default) cycle times are...fill - 8 min., brining and brine rinse - 80 min., backwash - 12 min., and fast rinse - 3 min. The fill cycle time is set during programming, page 13. Refer to the service information table, page 31, for suggested times of the other cycles, depending on the model. Use the following steps to check or change the regeneration cycle times.

NOTE: Removing from electrical power (varies from 2 to 3 days) resets time to factory programming.

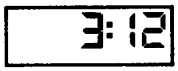
DISPLAY MUST SHOW TIME AND DAY

1. Press and **hold** SET/CLEAR for 3 seconds, until the entire display shows.

2. Press RECHARGE TIME and 2:08 will show, meaning the #2 cycle (brining and brine rinse) and 80 minutes (8x10).

If no change in this time is desired, go to step 3. **TO SET THE 60 MINUTE SUGGESTED BRINING TIME,** use the SET/CLEAR button to set 3:06. Adjustment between 0 and 150 minutes (2:00 to 2:15) is available.

3. Press RECHARGE TIME to display 3:12. This indicates the #3 cycle (backwash) and 12 minutes. Adjustment is available between 1 minute and 30 minutes (3:01 to 3:30), using the SET/CLEAR button.



NOTE: Instead of programming a double backwash, a longer single backwash is beneficial on some types of iron water.

4. Press RECHARGE TIME again to display 4:03, meaning #4 cycle (fast rinse) and 3 minutes. Pressing the SET/CLEAR button will change this time from 1 to 30 minutes (4:01 to 4:30) if a change is desired.

5. Press RECHARGE TIME and the entire display shows.

6. Press SET/CLEAR to return the present time.

TROUBLESHOOTING

ALWAYS MAKE THESE **INITIAL CHECKS** FIRST

1. Does the time display show the correct time of day?
   - . . .If display is blank, check power source to the water softener.
   - . . .If time is flashing, power was off for over 48 hours. The water softener resumes normal operation but regenerations occur at the wrong time.
   - . . .If an error code (Example: E-3) shows in the timer display, see AUTOMATIC ELECTRONIC DIAGNOSTICS.
2. Plumbing bypass valve(s) must be in service position (see figure 3, page 10).
3. The inlet and outlet pipes must connect to the softener valve inlet and outlet respectively.
4. Is the transformer plugged into a "live," grounded wall outlet, and the power cable fastened securely?
5. The valve drain hose must be free of kinks and sharp bends, and not elevated over 8 ft. above the floor.
6. Is there salt in the brine tank?
7. Is the brine tubing connected?

If you do not find the problem after making the initial checks, do the MANUAL ADVANCE DIAGNOSTICS.

AUTOMATIC ELECTRONIC DIAGNOSTICS

The face plate has a self-diagnostic function for the electrical system (except input power). The face plate monitors the electronic components and circuits for correct operation. If a malfunction occurs, an error code appears in the face plate display.

The chart, page 25 shows the error codes that could appear, and the possible defects for each code.

While an error code appears in the display, all face plate buttons are inoperable except the SET/CLEAR button. The SET/CLEAR remains operational so the service person can make the MANUAL ADVANCE DIAGNOSTICS to further isolate the defect.

SERVICE INFORMATION, SOLID STATE TIMER MODELS

ERROR CODE	POSSIBLE DEFECT MOST LIKELY ← → LESS LIKELY
E – 1	motor inop. / wiring harness or connection to switch / switch / face plate
E – 2, E – 3	face plate
E – 4	face plate / position switch

PROCEDURE FOR REMOVING ERROR CODE FROM FACE PLATE: 1. Unplug transformer 2. Correct defect 3. Plug-in transformer 4. Wait for 6 minutes. The error code will return if the defect was not corrected.
NOTE: See Replacing Face Plate, page 26.

MANUAL ADVANCE DIAGNOSTIC

Use the following procedures to advance the water softener valve through regeneration cycles to check operation.

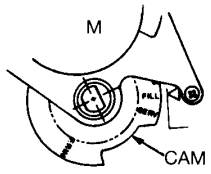
Remove top cover to observe cam and switch operation during valve rotation.

DISPLAY MUST SHOW TIME AND DAY

1. Press and **hold** SET/CLEAR for 3 seconds, until the entire display shows (18:88).

2. Press RECHARGE DAY to display the position switch (P) open or closed indicator. If the valve is in service, fill, brining, backwash or fast rinse, the display will show 2 dashes, meaning the switch is open.

While the valve is rotating from 1 cycle to another, display will show (– P), meaning the position switch is closed.



NOTES:
While in manual advance, the time display will automatically return to the present time, if a face plate button is not pressed within 4 minutes.

Pressing the ON/OFF, HOLD FOR RECHARGE button while the motor is running has no affect.

3. To enter FILL cycle, press and **hold** ON/OFF, HOLD for 3 seconds to start the motor.
   a. If the motor does not run, check the motor and all wiring connectors.
   b. Check for fill water flow to the brine tank. – If water **does not** enter the tank, look for an obstructed nozzle and venturi, fill flow plug or brine tubing (see figure 12, page 22).

4. After observing fill, press the ON/OFF, HOLD button to move the water softener into brining*. A slow flow of water to the drain will begin. Verify brine draw from the brine tank by shining a flashlight into the brinewell and observing a noticeable drop in the liquid level.

*If the DOUBLE BACKWASH option is set, the water softener will enter backwash and then fast rinse, before brining (see page 14).

NOTE: Be sure a salt bridge is not preventing water from contacting salt (see page 22).

   a. If the water softener does not draw brine. . .
      . . .nozzle & venturi dirty or defective (page 22)
      . . .nozzle & venturi not seated on gasket, or gasket defective (page 22)
      . . .restriction in valve drain, causing backpressure (bends, kinks, elevated too high, etc., see installation step 8)
      . . .obstruction in brine valve, or brine tubing (see repair parts page 32)
      . . .inner valve failure (obstruction in outlet disc, wave washer defective, etc.)

5. Again press ON/OFF, HOLD to move the softener into backwash. Look for a fast flow of water from the drain hose.
   a. An obstructed flow indicates a plugged top distributor, backwash flow plug, or drain hose.

6. Press ON/OFF, HOLD to move the softener into fast rinse. Again look for a fast drain flow. Allow the water softener to rinse for a few minutes to flush out any brine that may remain in the resin tank from the brining cycle test.

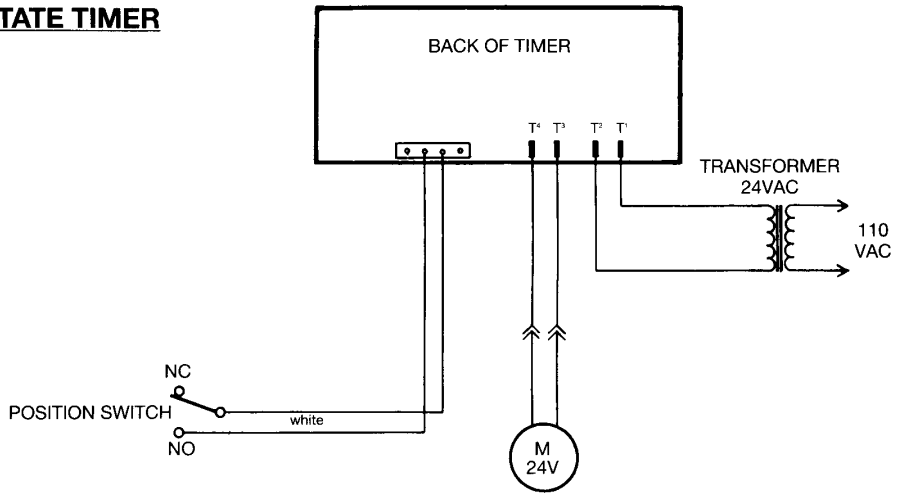
7. To return the softener to service, press ON/OFF, HOLD once.

8. Upon returning to service, press RECHARGE DAY to display 18:88.

9. Press SET/CLEAR to return the present time.

WIRING SCHEMATICS/REPLACING FACE PLATE

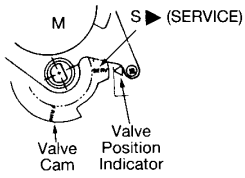
SOLID STATE TIMER



SOLID STATE/ELECTRONIC DEMAND FACE PLATE REPLACEMENT

BE SURE THE VALVE IS IN SERVICE POSITION (OBSERVE VALVE POSITION INDICATOR) WHEN REPLACING THE FACE PLATE.

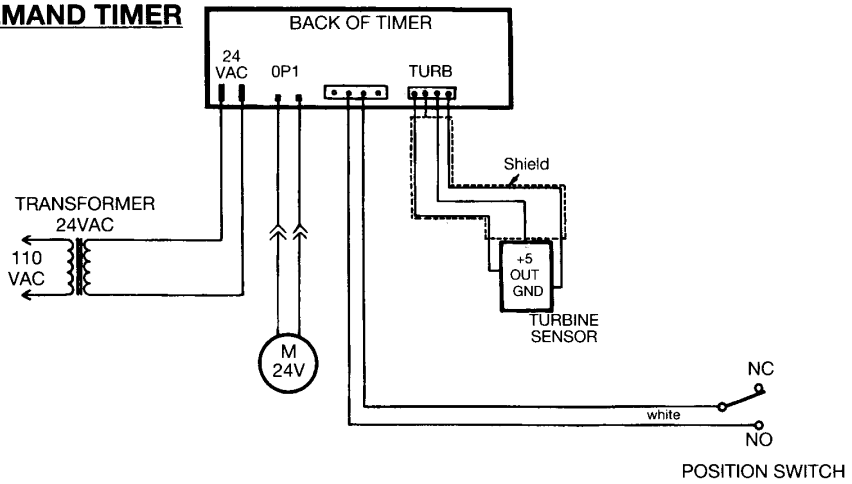
If, after installing and programming the replacement face plate, the valve is not in service position, do the following to assure correct cycle orientation, or timing, between the face plate and valve.



Use the MANUAL ADVANCE procedures, page 25 (solid state) or page 29 (electronic demand). Advance through the recharge cycles until the valve stops in service position, and RECHARGE no longer flashes in the timer.

NOTE: The valve motor may automatically drive through several valve positions while searching for service.

ELECTRONIC DEMAND TIMER



SERVICE INFORMATION, ELECTRONIC DEMAND TIMER MODELS

TROUBLESHOOTING

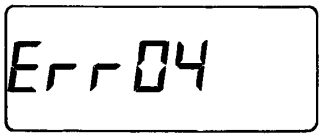
ALWAYS MAKE THE **INITIAL CHECKS** FIRST

1. Does the time display show the correct time of day?
   . . .If display is blank, check power source to the water softener.
   . . .If time is flashing, power was off for over 2 days. The water softener resumes normal operation but regenerations occur at the wrong time.
   . . .If an error code (Example: Err 03) shows in the face plate display, go to AUTOMATIC ELECTRONIC DIAGNOSTICS.
2. Plumbing bypass valve(s) must be in Full Service position.
3. The inlet and outlet pipes must connect to the softener valve inlet and outlet respectively.
4. Is the transformer plugged into a "live," grounded wall outlet, and the power cable fastened securely?
5. The valve drain hose must be free of kinks and sharp bends, and not elevated over 8 ft. above the floor.
6. Is there salt in the brine tank?
7. Is the brine tubing connected? (See repair parts page 32.)
8. Press the SELECT button 2 times to display the hardness setting. Be sure it is the correct setting for the household's water supply. (Make a hardness test of the raw water and compare with the hardness setting. Also test a soft water sample to verify if a problem exists.) Press SELECT twice more to return present time in the display.
9. Is the timer set to the correct model code? (See page 28).

If you do not find the problem after making the initial checks, do the MANUAL INITIATED ELECTRONIC DIAGNOSTICS, and the MANUAL ADVANCE REGENERATION CHECK

AUTOMATIC ELECTRONIC DIAGNOSTICS

The face plate computer has a self-diagnostic function for the electrical system (except input power and water meter). The computer monitors the electronic components and circuits for correct operation. If a malfunction occurs, an error code appears in the face plate display.



The chart below shows the error codes that could appear, and the possible defects for each code.

While an error code appears in the display, all face plate buttons are inoperable except the SELECT button. SELECT remains operational so the service person can make the MANUAL INITIATED ELECTRONIC DIAGNOSTICS (page 28) to further isolate the defect, and check the water meter.

ERROR CODE	POSSIBLE DEFECT MOST LIKELY ← → LESS LIKELY
Err 01	motor inop. / wiring harness or connection to switch / position switch / face plate
Err 02	wiring harness or connection to position switch / position switch / face plate
Err 03	wiring harness / face plate
Err 04	face plate / position switch
Err 05	face plate

PROCEDURE FOR REMOVING ERROR CODE FROM FACE PLATE:

1. Unplug transformer
2. Correct defect
3. Plug-in transformer
4. Wait for 6 minutes. The error code will return if the defect was not corrected.

SERVICE INFORMATION, ELECTRONIC DEMAND TIMER MODELS

CHECKING THE MODEL CODE ENTRY (See page 15)

Unplug the transformer at the electrical outlet, then plug in again. A "beep" will sound, then the model code displays for a few seconds. The test number will then display for a few seconds, followed by the present time display.

CHANGING THE MODEL CODE

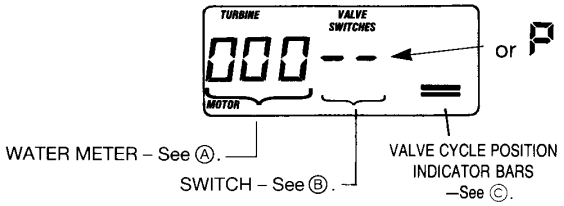
IMPORTANT: READ STEP 1, on page 15 BEFORE CHANGING THIS CODE.

1. Enter the secondary mode. . .press SELECT and hold for 3 seconds.
2. Again, press SELECT and hold in for 3 seconds. The current model code setting will display.
3. Use the (+) or (–) button to display the desired model code.
4. Press SELECT to set.
5. Reset the timer (page 15) and reselect other desired options.

MANUAL INITIATED ELECTRONICS DIAGNOSTICS

1. To enter diagnostics, press the SELECT button and hold (3 seconds) to display the gallons or liters of water used since installation.

2. Press SELECT twice more to display the following:



Ⓐ. The first 3 digits indicate water meter operation as follows:

000 (steady) = soft water not in use
. . .no flow through the meter

– OPEN A NEARBY SOFT WATER FAUCET –

000 to 199 (continual) = repeats display for each gallon of water passing through the meter

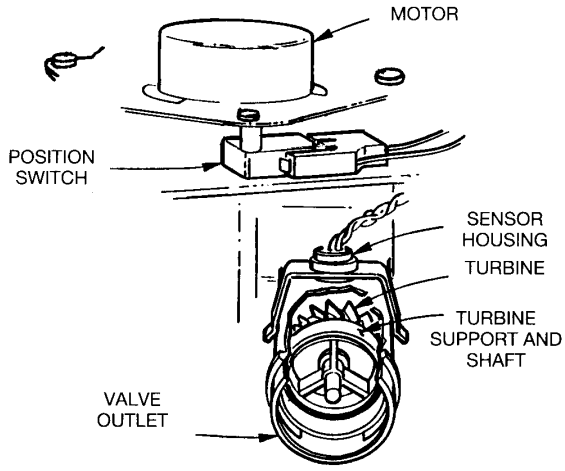
If you don't get a reading in the display, with faucet open, pull the sensor housing from the valve outlet port. Pass a small magnet back and forth in front of the sensor. You should get a reading. If you don't get a reading, unhook the outlet plumbing and check the turbine for binding. If you still don't get a reading, the sensor is probably defective. CAUTION: BE SURE TO TURN OFF WATER BEFORE YOU DISCONNECT PLUMBING.

Use the RECHARGE button to manually advance the valve into each cycle and check correct switch operation Ⓑ, and observe the valve position indicator bars Ⓒ.

Ⓑ. The letter (P) and dash(es) indicate POSITION switch operation. The letter appearing means the switch is closed; the dash means the switch is open.

CORRECT SWITCH DISPLAYS	VALVE CYCLE STATUS
– –	Valve in service, fill, brining, backwash or fast rinse position
– P	Valve rotating from one position to another

Ⓒ. When advancing the valve through the recharge cycles, the charge bar indicates valve positioning as follows...page 29.



SERVICE INFORMATION, ELECTRONIC DEMAND TIMER MODELS

INDICATOR BARS	VALVE CYCLE POSITION
bar(s) flashing	valve moving from 1 position to another
no bars	service
1 bar	fill
2 bars	brining/brine rinse
3 bars	backwash
4 bars	fast rinse

D. While in this diagnostic screen, the following information is available and may be beneficial for various reasons. This information is retained by the computer from the first time electrical power is applied to the face plate.
. . . Press (+) to display the number of days this face plate has had electrical power applied.
. . . Press (-) to display the number of regenerations initiated by this face plate since power was first applied.

E. Press SELECT several times until the present time display returns.

MANUAL ADVANCE REGENERATION CHECK

This check verifies proper operation of the valve motor, brine tank fill, brine draw, regeneration flow rates, and other controller functions. ALWAYS MAKE THE INITIAL CHECKS, AND THE MANUAL INITIATED DIAGNOSTICS.

NOTE: The face plate display must show a steady time (not flashing).

1. Press the RECHARGE button and hold in for 3 seconds. RECHARGE begins to flash as the softener enters the fill cycle of regeneration. Remove the brine well cover and, using a flashlight, observe fill water entering the tank.
   a. If water **does not** enter the tank, look for an obstructed nozzle, venturi, fill flow plug, or brine tubing.
2. After observing fill, press the RECHARGE button to move the softener into brining. A slow flow of water to the drain will begin. Verify brine draw from the brine tank by shining a flashlight into the brinewell and observing a noticeable drop in the liquid level.

NOTE: Be sure a salt bridge is not preventing water with salt contact.

   a. If the softener does not draw brine. . .
      . . .nozzle and/or venturi dirty or defective.
      . . .nozzle and venturi not seated properly on gasket.
      . . .restricted drain (check drain fitting and hose).
      . . .defective nozzle and venturi seal.
      . . .other inner valve defect (rotor seal, rotor & disc, wave washer, etc.).

NOTE: If water system pressure is low, an elevated drain hose may cause back pressure, stopping brine draw.

3. Again press RECHARGE to move the softener into backwash. Look for a fast flow of water from the drain hose.
   a. An obstructed flow indicates a plugged top distributor, backwash flow plug, or drain hose.
4. Press RECHARGE to move the softener into fast rinse. Again look for a fast drain flow. Allow the softener to rinse for a few minutes to flush out any brine that may remain in the resin tank from the brining cycle test.
5. To return the softener to service, press RECHARGE once more.

SERVICE INFORMATION – ROTARY VALVE

BEFORE WORKING ON THE VALVE, TURN OFF THE WATER SUPPLY AND DISCONNECT FROM ELECTRICAL POWER. TO RELIEVE PRESSURE. . .

. . .3 VALVE BYPASS: Close the inlet valve and open a soft water faucet. Then close the outlet valve and open the bypass valve.

. . .OPTIONAL BYPASS VALVE: Slide the bypass valve stem to bypass position. Loosen the 3 hex head screws (see A in drawing) toward the backside of the valve to allow pressure water to bleed out (catch water with a rag).

DISASSEMBLY

To remove a part or group of parts, refer to the valve drawing. A common screwdriver or nut driver, Phillips screwdriver and pliers are the only tools needed to completely disassemble.

SERVICING THE VALVE

Inspect all o-rings, seals and gaskets for wear or defects.

Inspect the bottom surface of the rotor and disc for scratches, chips or wear.

NOTE: If replacement is needed, be sure to use the current replacement part.

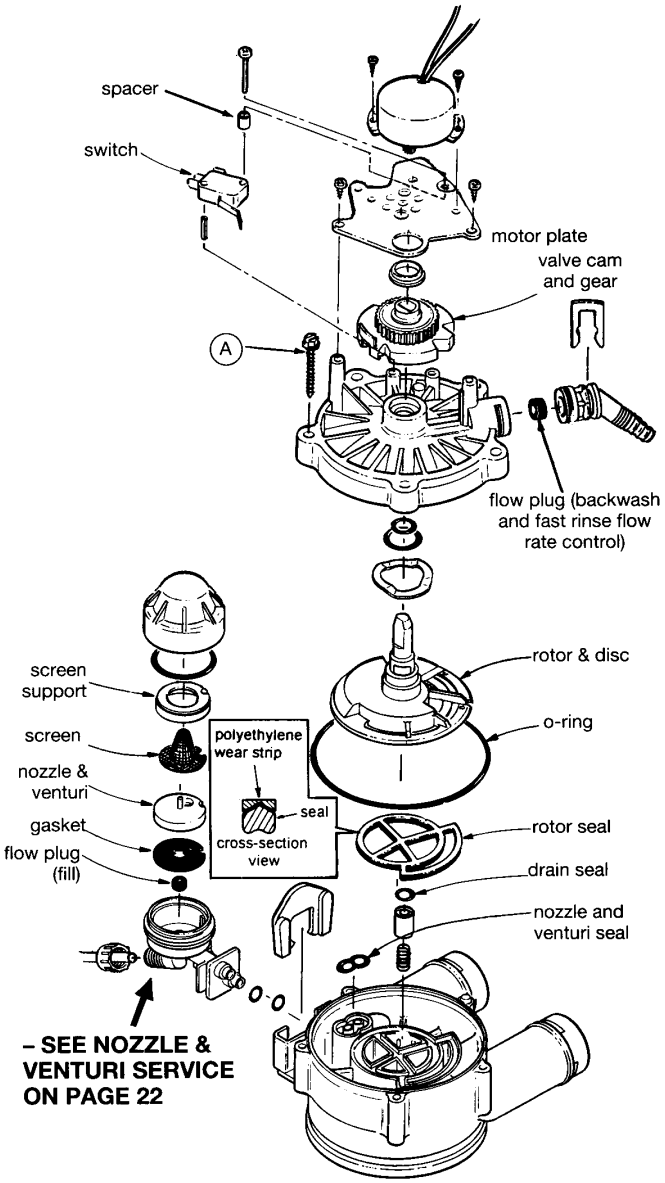
ASSEMBLY

Be sure all parts are in place and in the proper position. Lubricate ALL o-rings and seals with FDA approved silicone grease.

When installing the rotor seal, first place the seal in the valve groove, with the rounded side down (see cross-section). Apply a light coating of silicone grease to the seal crossing ribs. Then, carefully center the wear strip on the seal and push it downward, onto the seal.

Install the nozzle and venturi seal, and drain seal. Assemble 2 o-rings and the wave washer onto the rotor and disc. Then center the rotor and disc, in the valve body, on the rotor seal.

Lower the cover onto the valve body and rotor shaft. Then install the cover holding screws. BEFORE TIGHTENING THE SCREWS, INSTALL THE VALVE CAM AND GEAR. THEN TURN THE ROTOR CLOCKWISE ONLY TO SERVICE POSITION. Tighten the screws using a criss-cross pattern. If a torque wrench is available, torque to 30-40 inch pounds.



Lubricate the gear on the motor, and the valve cam gear with Molykote grease, or other high quality gear lubricant.

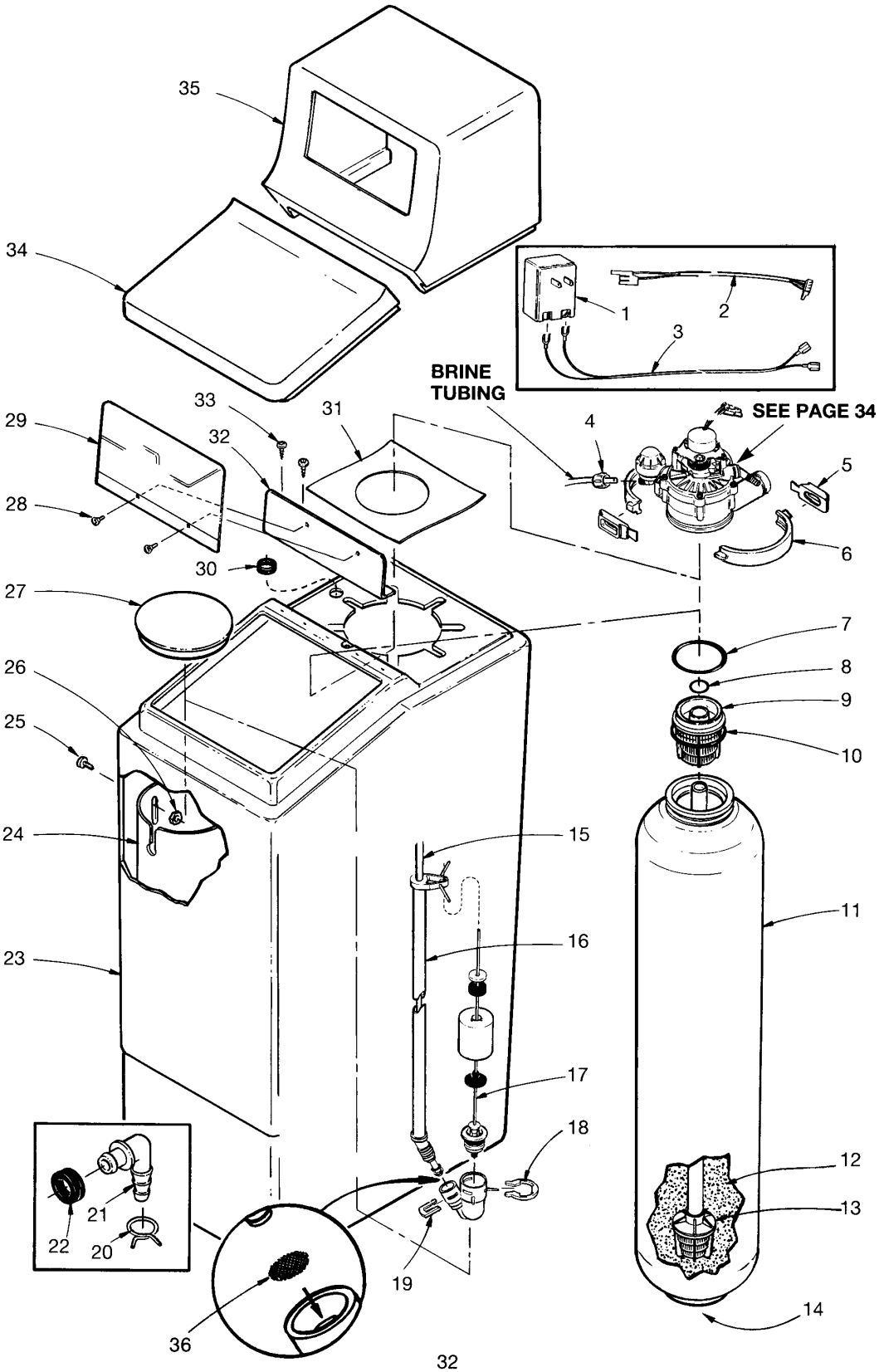
Be sure to orient switch as shown, with lever toward the valve cam.

SERVICE INFORMATION TABLE

		511	514	518
FILL CYCLE	MINUTES①	See table, page 13		
	FLOW (GPM)	.1	.1	.1
BRINING AND BRINE RINSE CYCLE	MINUTES	60	60	60
	BRINING FLOW (GPM)	.16	.16	.16
	BR.RNS.FLOW(GPM)	.11	.11	.11
BACKWASH CYCLE	MINUTES	12	12	12
	FLOW (GPM)	1.8	1.8	1.8
FAST RINSE CYCLE	MINUTES	3	3	3
	FLOW (GPM)	1.8	1.8	1.8
RESIN LOAD	POUNDS	19	27	32.1
	CUBIC FT.	.37	.52	.62
SALT STORAGE CAPACITY — POUNDS		60	90	120

①On Electronic Demand (ED) models, fill time is automatically determined by the timer, depending upon the capacity operating level.

REPAIR PARTS



REPAIR PARTS

KEY NO.	PART NUMBER	DESCRIPTION
1	7095373	Transformer
2	7118333	Wire Harness
3	7132840	Power Cord
4	1202600	Nut Ferrule
5	7088033	Clamp Retainer (2)
6	7196292	Clamp Section (2)
7	7170296	O-Ring, 2-7/8" I.D. x 3-1/4" O.D.
8	7170254	O-Ring, 13/16" I.D. x 1-1/16"O.D.
9	7077870	Top Distributor
10	7170270	O-Ring, 2-3/4" I.D. x 3" O.D.
11	7103273	Resin Tank – 511
	7103281	Resin Tank – 514 Also order Key
	7114787	Resin Tank – 518 No. 14, if needed
12	502272	Resin, 1 cu. ft. (standard mesh) ①
	501741	Resin,1/2 cu. ft. (standard mesh) ①
	7052202	Resin, 1 cu. ft. (fine mesh) ① ②
13	7105047	Repl. Distributor (bottom)
14	7147227	Spacer – 514
	7145673	Spacer – 518
15	7113016	Tubing Assembly, BV
16	7106904	Brine Valve Assembly – 511 ③
	7116488	Brine Valve Assembly – 514, 518 ③
17	7113008	Float, Stem and Guide Assembly
18	1205500	Clip
19	7080653	Clip
20	900431	Hose Clamp ④
21	1103200	Hose Adaptor ④
22	9003500	Grommet ④
23	7125990	Brine Tank – 511
	7126001	Brine Tank – 514
	7126019	Brine Tank – 518
24	7106962	Brinewell – 511
	7106970	Brinewell – 514
	7109871	Brinewell – 518
25	900712	Screw
26	900706	Nut
27	500283	Brinewell Cover
28	900300	Screw, #4-40x1/4 (2)
29	7151802	Faceplate (Timer) Assembly – Elec. Demand
	7125966	Faceplate (Timer) Assembly – Solid State
30	7094995	Grommet
31	7145607	Vapor Barrier
32	7106807	Bracket
33	7115288	Screws #10-16x9/16 (5)
34	7108710	Salt Hole Lid
35	7106988	Cover
36	7131365	Screen
■	0010069	Drain Hose, 7/16" I.D. x 350' ⑤
■	7129871	Bypass Valve ⑤
■	0504574	Copper Drain Fitting ⑤

① See specifications for amount needed.

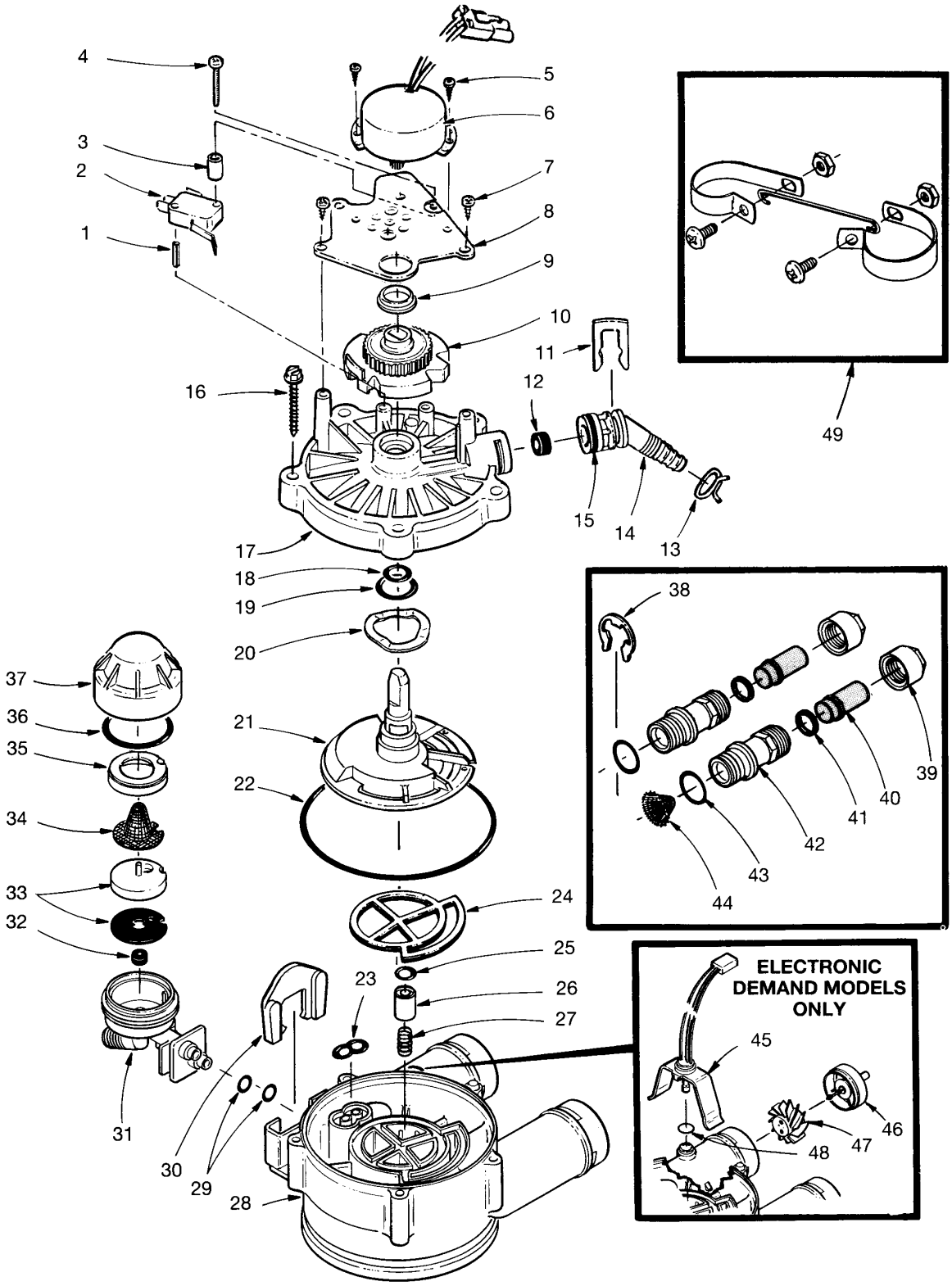
② Standard mesh resin included – fine mesh available separately.

③ Includes Key Nos. 15, 17, 18, 19 and 36.

④ Included in small parts bag . . . see page 35.

⑤ Optional item

REPAIR PARTS



REPAIR PARTS

KEY NO.	PART NUMBER	DESCRIPTION
1	7077472	Expansion Pin
2	7030713	Switch
3	7117816	Spacer
4	7070412	Screw, #4-24 x 1-1/8 (flat head)
5	900120	Screw, #6-18 x 3/8 (2 req.)
6	7132989	Motor
7	900857	Screw, #6-20 x 3/8 (2 req.)
8	7117808	Motor Plate
9	503288	Bearing
10	7113927	Cam and Gear
11	7080653	Clip (Drain)
12	501228	Flow Plug, #18
13	900431	Hose Clamp
14	7024160	Drain Hose Adaptor
15	7170327	O-Ring, 5/8 x 13/16
16	7074123	Screw, #10-14 x 2 (5 req.)
17	7085263	Valve Cover
18	7170238	O-Ring, 7/16 x 5/8
19	7170212	O-Ring, 3/4 x 15/16
20	7082087	Wave Washer
21	7103964	Rotor & Disc
22	7170246	O-Ring, 3-3/8 x 3-5/8
23	7081764	Seal (Nozzle & Venturi)
24	7134224	Rotor Seal (includes polyethylene wear strip)
25	7170204	O-Ring, 3/8 x 9/16
26	7092642	Plug (Drain Seal)
27	1219600	Spring
28	7082053	Valve Body
29	7170319	O-Ring, 1/4 x 3/8 (2 req.)
30	7081201	Retainer (Nozzle & Venturi)
31	7081104	Nozzle & Venturi Housing
32	521829	Flow Plug, .1 gpm
33	7113024	Nozzle & Venturi – Gasket Kit (white)
34	7146043	Screen
35	7168621	Screen Support (Incl. Key No. 36)
36	7170262	O-Ring, 3/8 x 1-3/8
37	7081188	Cap
38	7116713	Clip (2 req.)
39	507369	Installation Nut (2 req.)
40	507615	Installation Tube (2 req.)
41	7170335	Washer (2 req.)
42	2207800	Installation Adaptor (2 req.)
43	7170288	O-Ring, 15/16 x 1-3/16 (2-req.)
44	900568	Screen (inlet) - discontinued 1/93
45	7097171	Sensor Housing – electronic demand
46	2204101	Turbine Support and Shaft – electronic demand
47	7117858	Turbine – electronic demand
48	0900060	O-Ring – electronic demand
49	7114826	Ground Clamp Kit
■	7085239	Nozzle & Venturi Assem. (Incl. Key Nos. 31 through 37)
■	7129716	Seal Kit (Incl. Key Nos. 18, 19, and 22 through 25)
■	7125982	Repl. Valve Assembly (Incl. Key Nos. 16 through 28)
■	7136072	Small Parts Bag (Incl. Key Nos. 13, 38 through 43, 49, and Key Nos. 20, 21, 22 on page 33)

WARRANTY

ECOWATER SYSTEMS, INC.
ADVANTAGE WARRANTY
SERIES 500 WATER SYSTEM

EcoWater Systems, Inc., guarantees to the original owner, that:

1. for the **lifetime of the original owner,** the **fiberglass mineral tank** will not rust, corrode, leak, burst, or in any other manner fail to perform its proper function;
2. for a period of **ten (10) years after installation**, the **salt tank** will not rust, corrode, leak, burst, or in any other manner fail to perform its proper function;
3. for a period of **three (3) years after installation**, the **valve body** will be free from defects in material and workmanship; and that
4. for a period of **three (3) years after installation**, the **electronic computer control panel**, and **all other parts** will be free from defects in material and workmanship.

If during such respective period a part proves, after inspection by EcoWater, to be so defective, EcoWater will, at its sole option, either replace or repair the defective part without charge except normal shipping and installation charges. During the first three (3) years after installation, parts necessary to maintain the mineral tank, brine tank, valve body and electronics in factory operating condition in accordance with specifications published in the Owner's Guide, shall be furnished at absolutely no cost other than normal shipping charges. Service necessary to maintain all other parts is limited to one (1) year.

General Provisions

The above warranties are effective **provided** that the water conditioner is operated at water pressures not exceeding 125 p.s.i. and at temperatures not exceeding 120 degrees F; provided further that the water conditioner is not subject to abuse, misuse, alteration, neglect, freezing, accident or negligence; and provided further that the water conditioner is not damaged as the result of any unusual force of nature such as, but not limited to flood, hurricane, tornado or earthquake. EcoWater Systems, Inc. is excused if failure to perform its warranty obligations is the result of strikes, government regulation, materials shortages, or other circumstances beyond its control.

To obtain warranty service, notice must be given within thirty (30) days of the discovery of the defect to your local EcoWater Systems dealer.

THERE ARE NO WARRANTIES ON THE WATER CONDITIONER BEYOND THOSE SPECIFICALLY DESCRIBED ABOVE. ALL IMPLIED WARRANTIES, INCLUDING ANY IMPLIED WARRANTY OF MERCHANTABILITY OR OF FITNESS FOR A PARTICULAR PURPOSE, ARE DISCLAIMED TO THE EXTENT THEY MIGHT EXTEND BEYOND THE ABOVE PERIODS. THE SOLE OBLIGATION OF ECOWATER SYSTEMS, INC. UNDER THESE WARRANTIES IS TO REPLACE OR REPAIR THE COMPONENT OR PART WHICH PROVES TO BE DEFECTIVE WITHIN THE SPECIFIED TIME PERIOD, AND ECOWATER IS NOT LIABLE FOR CONSEQUENTIAL OR INCIDENTAL DAMAGES. NO ECOWATER DEALER, AGENT, REPRESENTATIVE, OR OTHER PERSON IS AUTHORIZED TO EXTEND OR EXPAND THE WARRANTIES EXPRESSLY DESCRIBED ABOVE.

Some states do not allow limitations on how long an implied warranty lasts or exclusions or limitations of incidental or consequential damage, so the limitations and exclusions in this warranty may not apply to you. This warranty gives you specific legal rights, and you may also have other rights which vary from state to state. This warranty applies to consumer-owned installations only.

GUARANTEE BOND

The Continental Casualty Company, an Illinois corporation, has issued its bond in the form shown below, guaranteeing full performance by EcoWater Systems, Inc.

CONTINENTAL CASUALTY COMPANY, Chicago, Illinois, herinafter called "Surety," guarantees unto Harris Trust and Savings Bank, 111 West Monroe Street, Chicago, Illinois, as Trustee holding said Guarantee Bond under the terms of a Trust Agreement dated September 15, 1963, for the use and benefit of original purchasers of residential EcoWater Systems Units within the Continental United States, as described herein, that EcoWater Systems, Inc., will discharge the obligations of the "EcoWater Bonded Parts and Service Guarantee Policy."

PROVIDED, HOWEVER, that:

1. Liability of Surety hereunder shall not exceed the sum of FIVE HUNDRED AND 00/100th DOLLARS ($500.00) as to any one installation, and shall not exceed the sum of FIVE HUNDRED THOUSAND AND 00/100th DOLLARS ($500,000.00) in the aggregate, and
2. There shall be no liability hereunder as to any purchaser to whom there has not been issued at the time of installation and purchase completed registration card which is enclosed with a facsimile of this bond, and who has not returned such card in accordance with this guarantee.
3. Claim must be made by such original purchaser in writing within 30 days from the expiration of these guarantees upon EcoWater Systems, Inc., P.O. Box 64420, St. Paul, MN 55164, to perform the terms of said guarantee, and notice of any default on such guarantee must be sent to Surety at its address by Registered Mail.

CONTINENTAL CASUALTY COMPANY

attest: _____
assistant secretary

by: _____
vice-president

This is to certify that the original of the above guarantee and bond is on file with Harris Trust and Savings Bank, 111 West Monroe Street, Chicago, Illinois.

HARRIS TRUST AND SAVINGS BANK
As Trustee

by: _____
authorized officer